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WARTIME LUMBER PRODUCTION IN THE APPALACHIAN HARDWOOD REGION

January 1942 - June 1944

by

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A FOREST SURVEY PROGRESS REPORT

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PREFACE

Through the McSweeny-McNary Act of 1928, Congress authorized the Secretary of Agriculture to conduct a comprehensive survey of the forest resources of the United States. The Forest Survey was organized by the Forest Service to carry out the provisions of the Act, and each of the 11 Regional Forest Experiment Stations is responsible for the work in its territory. In the Middle Atlantic States the Forest Survey is an activity of the Appalachian Forest Experiment Station, Asheville, North Carolina.

The work of the Survey is divided into five major phases:

1. Inventory. Determination of the extent, location, and condition of forest lands, and the quantity, species, and quality of timber on these lands.

2. Growth. Determination of the current rate of timber growth.

3. Drain. Determination of the amount of industrial and domestic wood used, and the total loss resulting from fire, insects, disease, suppression, and other causes.

4. Requirements. Determination of the current and probable future requirements for forest products by all classes of consumers.

5. Policies and plans. Analysis of the relation of these findings to one another and to other economic factors as a basis for public and private policies and plans of forest land use and management.

This progress report summarizes information having a bearing upon one part of the drain phase of the Survey, and deals specifically with the production of lumber in the Appalachian hardwood region in the period from January 1, 1942, to June 30, 1944, together with a discussion of the factors that affected lumber production during this period.

The report is made possible through the assistance received from the War Production Board, the Bureau of the Census, and the Tennessee Valley Authority.

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WARTIME LUMBER PRODUCTION

IN THE APPALACHIAN HARDWOOD REGION

January 1942 - June 1944

INTRODUCTION

In this war lumber is one of the most essential materials. The demand for lumber increased steadily throughout 1941 and became pronounced in the spring of 1942. This was the period of "bottlenecks" and of material shortages that became critical seemingly overnight. Forest products, however, were regarded as a great reservoir which could be drawn upon in any quantity to meet expanding requirements, and so, as shortages of other materials developed, wood was advanced as a substitute. By December 1941 over 1,200 different items of military and naval equipment required lumber. On a tonnage basis, the war program was using 25 percent more wood than steel. Consumption of lumber in 1941 was 17 percent greater than in 1940; in 1942 it was 9 percent above 1941. By mid-summer 1942 lumber had taken its place with rubber, steel, and copper on the "critical" list.

Because it contains such a great variety of high quality timber the Appalachian hardwood region has made a particularly valuable contribution to the war effort. Oak shiptimbers and bending stock, walnut flitch for gunstocks, yellowpoplar aircraft lumber, export ash, and basswood for splints and ship patterns are only a few of the special items flowing from the lumber mills of the region. In addition, great quantities of truck body lumber, wooden mine materials, box lumber, crossties, and industrial blocking are produced.

Lumber, like all critical war materials, has been the subject of various governmental regulations since our entry into the war, and these controls must be constantly adjusted to meet changing conditions as long as the war lasts. To formulate sound policies it is essential to have accurate facts and figures as a basis for decisions. This is particularly true in the lumber industry, which is composed of thousands of small producing units. Since 1942 the Forest Survey has been collecting current information on lumber production in the Appalachian hardwood region, chiefly in cooperation with the War Production Board. This report, which summarizes the facts collected to date, is designed to provide war agencies with a comprehensive and reliable picture of the lumber industry in the region. In addition, the report should prove useful to wood-using industries, chambers of commerce, public officials, and others interested in lumber production in the Appalachians.

THE REGION

The Appalachian hardwood region consists of the high plateau and mountain portions of Maryland, Virginia, the Carolinas, Georgia, Tennessee, Kentucky, and the entire state of West Virginia (figure 1). Its boundaries, as defined by the Office of Price Administration, do not include northeastern Alabama, once considered part of the region because of the similarity of its forests to those of neighboring Tennessee and Georgia.1/

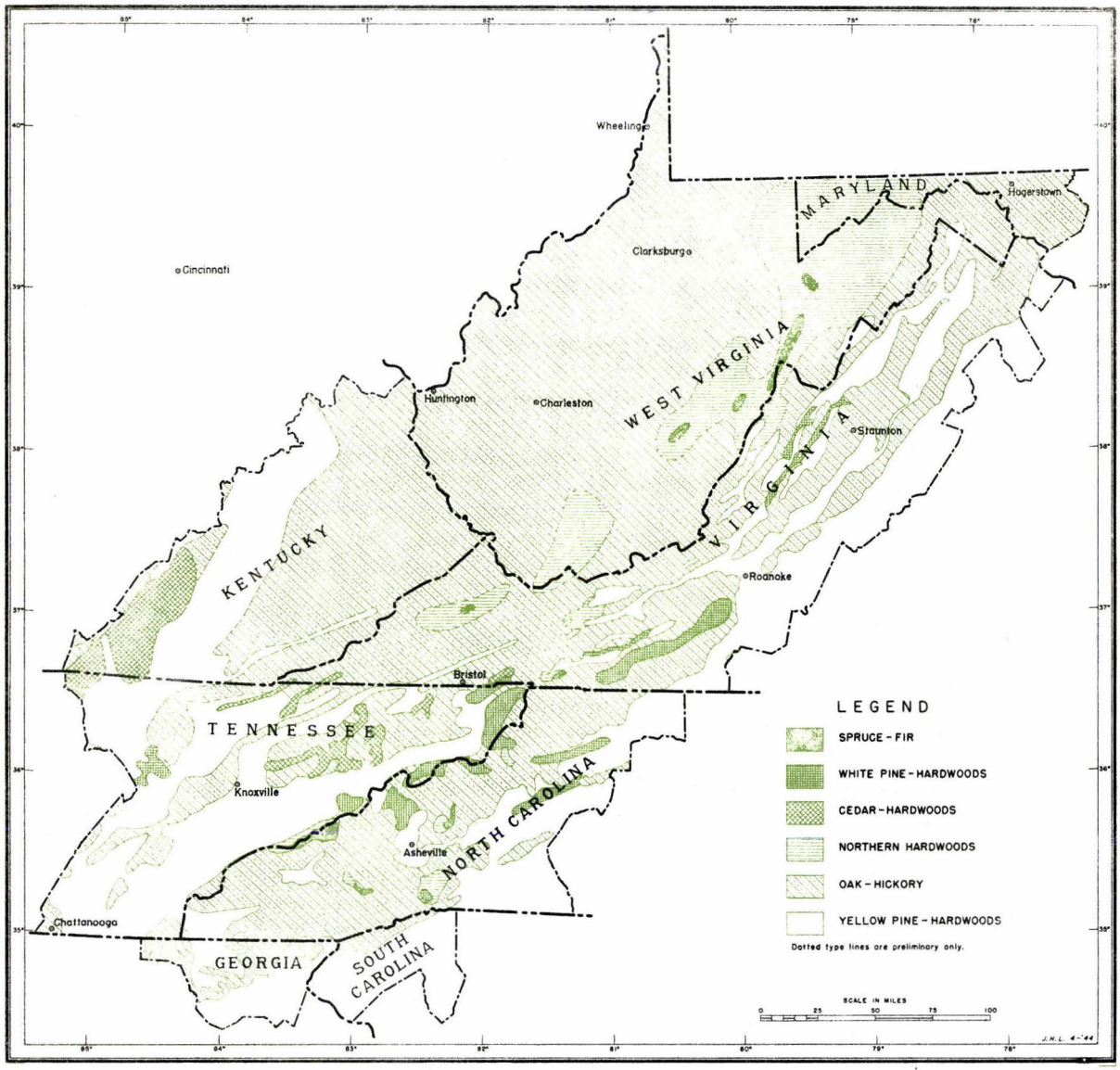


Figure 1. - The Appalachian hardwood region.

1/Maximum Price Regulation 146 defines as one portion of the boundary the Nashville, Chattanooga, and St. Louis Railroad from its intersection with the western boundary of Hamilton County, Tenn., easterly through Chattanooga to the Georgia line. For statistical convenience in this report the boundary is assumed to include all of Hamilton County.

The terrain is generally difficult and precipitous, 85 percent having a gradient of more than one foot in five. Extensive areas of agricultural land occur in the limestone valleys of the Appalachian mountains and in the rolling hills along the Ohio River, but elsewhere farming is confined to small scattered areas where topography and soil are favorable. Of the 55 million acres in the region, 56 percent are forested. Originally forests may have covered as much as 99 percent of the land.

Forest ownership is characterized by a high percentage of large holdings. Forty-five percent of the forest is held by coal and lumber companies, in estates, and other large private ownerships. In about 90 of the 203 counties more than one-third of the forest is so owned. Only 35 percent of the forest land is in farm woodlots. Large blocks of public land, including eight national forests, contain 20 percent of the forest acreage.

The Appalachian forest, located as it is at the juncture of the forests of the Northeast, the Central States, and the Southeast, is the most diversified in the United States. Frothingham[1/] lists about 140 native tree species, of which 60 are commercially important. Included are the spruce, birch, and hard maple common to the Northeast, the basswood, buckeye, and walnut of the Central States, and the yellow pine and sweet gum of the Southeast. Oaks, yellow pines, yellowpoplar, and maples furnish 75 percent of the saw timber.

Very little old growth saw timber remains and much of it is in small scattered tracts. Practically all has been culled over at some time in the past. It is estimated that about 35 percent of the forest land supports saw timber stands, 60 percent supports young second growth, and 5 percent is not stocked. Second growth stands of sawlog size are the main support of present lumber operations and are distributed rather uniformly over the region. Many have had a part of their volume removed and now average no more than 1,600 board feet per acre. Insufficient volume per acre and a preponderance of small low-value trees make extensive areas of potential saw timber inoperable for years to come. Eventually, the forest industries must depend upon the young timber now below sawlog size. These stands are the principal component of the forest, and their protection and management is vitally important to the future of the region.

THE LUMBER INDUSTRY

Historical

No general market for logs, lumber, or manufactured products developed in the Appalachian region until the latter half of the 19th century, but localized lumbering started soon after settlement of the country in the 1730's. Logging began in the larger river valleys and extended back to the hills. The first species cut was the white pine of the Potomac and James watersheds, which grew in dense stands and could be easily logged and floated

1/Frothingham, E. H., 1931. Timber growing and logging practice in the southern Appalachian region. U. S. Dept. of Agri. Tech. Bul. 250, 93 pages.

to market. The earliest instance of hardwood logging may have been the cutting in the Kanawha Valley of white oak for barrels and yellowpoplar for barges used by the thriving local salt industry. Soon buyers of walnut and cherry logs penetrated deep into the mountains, and simultaneously oak and pine for shipbuilding came into demand. At first, all species were driven or rafted, hardwood logs being cut in the late summer and fall and dried through the winter so they would float.

Early logging removed only the choicest and most accessible white pine, walnut, cherry, yellowpoplar, white oak, basswood, and cucumber. But, with the introduction of logging railroads and modern logging methods, succeeding cuts became more intensive, and operations were extended into nearly all parts of the mountains. The peak of production was reached in 1909 with a lumber cut of about 4 billion board feet. Thereafter the general trend was downward to a low in the depression year 1932.

The Sawmill Operators

Size and number of operations: Although maximum production was achieved by 1909, the inaccessibility of many areas delayed the removal of the original timber. In territory where logs and lumber could be transported only in or along streams, individual companies frequently gained control of entire watersheds. As a result, large-scale operations figured prominently in the Appalachian lumber industry until comparatively recent years. However, the past decade has seen the passing of most of the bandmills, leaving this primarily a region of many small producers.

Table 1. - Number of active sawmills and average production per mill by classes, 1942.

Annual production class	Plants	Average production
M bd.ft.	Number	M bd.ft.
1 - 49	1,700	22
50 - 499	3,315	174
500 - 999	578	683
1,000 - 4,999	297	1,739
5,000 - 9,999	28	6,911
10,000+	8	18,896
All mills	5,926	316

The 1942 output of lumber was from more than 5,900 plants, representing 15 percent of all the operating sawmills in the United States. An additional 1,466 mills were recorded as idle, and there were undoubtedly others that had been out of operation too long to be traced. Of the total production, 82 percent was from 5,890 sawmills which, individually, produced less than 5 million board feet.

Types of producers: Lumbering enterprises are of five kinds: independent operation, custom sawing, contract logging and sawing, operation under a financial tie-up, and captive sawmills.

About 70 percent of the producers are independent operators who buy stumpage or logs and sell directly to wholesalers, concentration yards, coal companies, and other purchasers of lumber, assuming all business risks. Frequently, as in the case of most large companies, the timber cutting, the yarding, and to a lesser extent the log hauling are contracted.

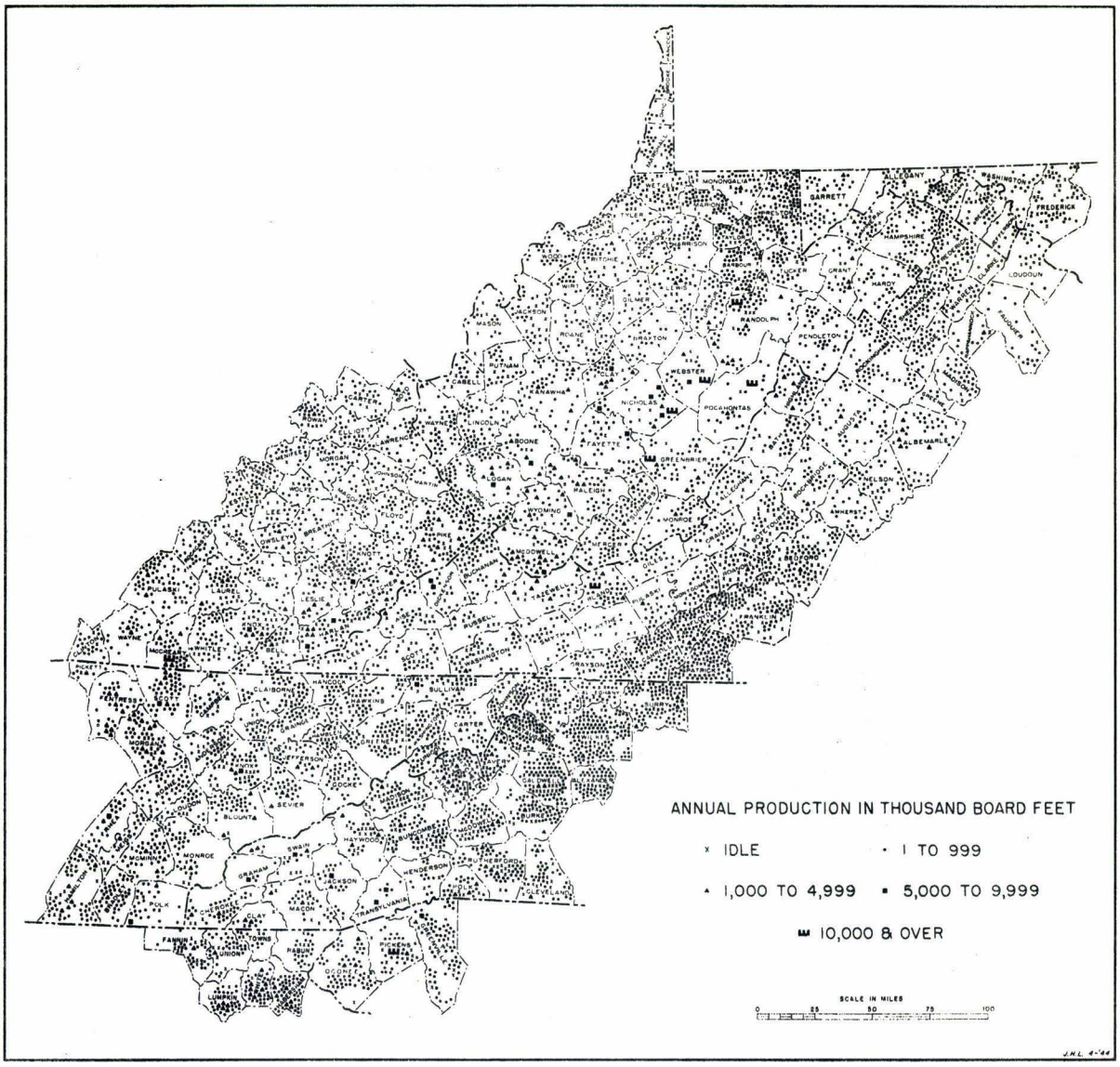


Figure 2. - Distribution of sawmills in the Appalachian hardwood region, 1942.

Most of the smallest producers and an appreciable number of the others own no timber and are custom operators sawing small lots of logs to order. A flat charge of $5 to $12 per thousand board feet is made for this service, the stumpage owner assuming responsibility for the logging and usually for the lumber hauling. Approximately 10 percent of the operations are of this type. In addition, about 40 percent of the independents do some custom work, the volume involved amounting to 17 percent of their total output. Custom-sawn lumber is used chiefly for farm construction and repairs, but in some localities is sold to coal or oil companies, railroads, and local lumber dealers.

When considerable volumes of logs are involved or when an operator agrees to log and saw for a timber owner, it is customary to draw up a contract specifying some or all of the following: price, products, standards of utilization, provision for trails, roads, and transportation, minimum rate of output, and ownership of slabs and other waste. The agreed price per thousand often includes delivery of the lumber and varies from $16 to $34 for stump-to-customer service. About 15 percent of the sawmills now operate under contract to lumber concentration yards, coal companies, box plants, and other timber owners.

The fourth class includes the few mills financed in whole or in part by commercial lumber buyers who assume control of the output as a return for their assistance. Captive sawmills, those owned outright by lumber-consuming industries, are also few in number and are peculiar to the yellow pine sector of the industry. Together, these two classes include the remaining 5 percent of the mills.

The Sawmills

Bandmills: There were 85 bandmills on record as of December 31, 1942. Of this number 81 had operated all or part of the year (table 2). Individual capacities ranged from 15 to 140 thousand board feet per 8-hour day, and the combined daily capacities of the operating mills was 2.4 million board feet. Actual output was only 65 percent of capacity but accounted for nearly 25 percent of the total production in the region and for possibly 60 percent of the volume of cutting grades and special quality items.

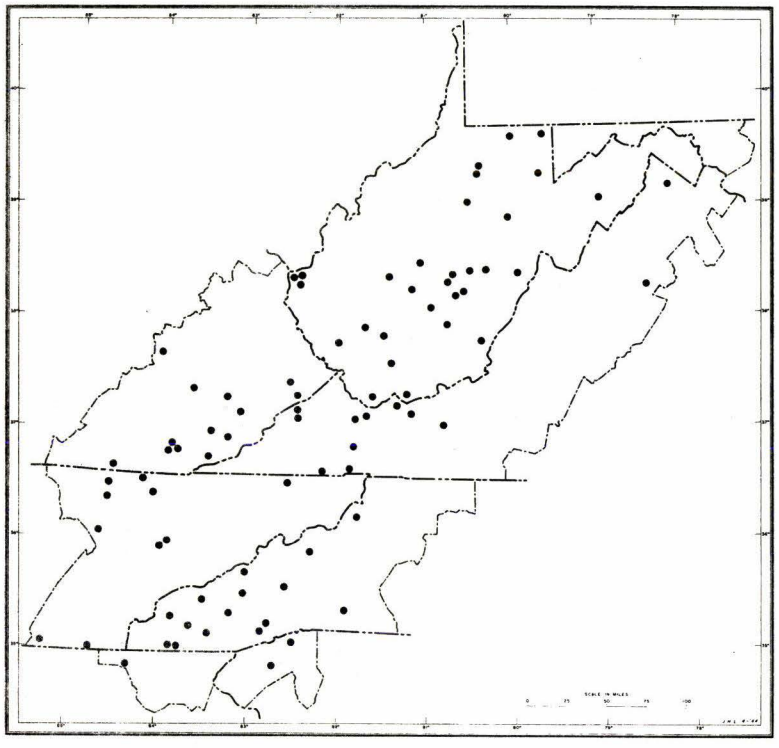


Figure 3. - Distribution of bandmills in the Appalachian hardwood region, 1942.

During 1942 four plants ceased operation and eight more shut down in 1943. These shut-downs were partially offset by the establishment of three new bandmill operations in 1943. Nevertheless, at year's end there were nine fewer active operations than in January 1942. Principal cause of shut-downs was exhaustion of timber, and eight of the twelve are believed to be permanently out of production. These eight represent a loss of productive capacity equal to approximately 60 million board feet per year,

or 8½ percent of total bandmill capacity. Losses during 1944 and 1945 are expected to be even more severe in spite of current efforts to open up large areas of old growth forest in Kentucky.

Table 2. - Analysis of bandmill operation, 1942.

Annual production class	Plants	Average daily capacity	Average daily production	Degree of capacity attained	Total bandmill production
M bd.ft.	Number	M bd.ft.	M bd.ft.	Percent	Percent
50 - 499	6	20.7	1.0	4.9	0.4
500 - 999	2	15.5	2.0	12.9	0.3
1,000 - 4,999	39	21.9	10.5	47.7	26.8
5,000 - 9,999	26	28.9	23.1	79.7	39.4
10,000+	8	74.4	63.0	84.7	33.1
Total	81	29.1	18.9	64.6	100.0

Circular mills: Circular sawmills accounted for 75 percent of the 1942 lumber production. Of the 7,300 such plants on record, 5,845 or 80 percent operated at some time during the year. These mills ranged from small waterpower installations with daily capacities of less than one thousand board feet to twin-saws with duplex carriage feeds capable of producing 20 to 25 thousand board feet per day. However, capacity of the equipment is a poor index to the output of most circular sawmills. Very few operate full time, and the labor force employed varies widely among plants of similar size. Many have but one crew which alternately logs and saws. Frequently, a large mill is purchased to saw out a single tract of timber and remains as an insignificant producer in the vicinity after the job is completed. In the case of the smaller producers, operating time rather than actual capacity is the principal factor determining production. Thus, the 5,009 mills that produced less than half a million board feet each in 1942 represented 72 percent of total circular capacity but produced only 43 percent of the lumber.

Table 3. - Analysis of circular mill operation, 1942.

Annual production class	Plants	Average daily capacity	Average yearly operating time	Degree of capacity attained	Total circular production
M bd.ft.	Number	M bd.ft.	Days	Percent	Percent
1 - 49	1,700	2	11	3.6	2.6
50 - 499	3,309	3	58	19.3	40.7
500 - 999	576	5	137	45.6	27.8
1,000 - 4,999	258	9	170	56.6	27.9
5,000 - 9,999	2	25	272	90.7	1.0
Total	5,845	3	81	25.4	100.0

Carriage lengths: The production of long timbers such as ship-keel stock requires specialized equipment in both mill and woods. Before the war only a few companies were able to supply this type of material. Many

bandmills have the heavy skidding, loading, and hauling facilities needed but are unable to saw the logs. Only 13 are equipped to handle timbers exceeding 32 feet. Maximum is 40 feet and timbers this length are sawed by two mills.

Since alteration of bandmills to permit cutting longer pieces is usually impractical, war needs have increased the number of long-carriage circular sawmills. Information as to the number of these mills is incomplete, but on the basis of available data there are probably at least 24 equipped to produce timbers 36 feet or longer and two or three can handle 50-foot lengths. Some are converted short-carriage mills. At least one manufacturer of sawmill equipment supplies carriages as well as track and frames in sections which can be built up in multiples of five feet to any desired length.

Edgers and trimmers: The use of edgers is more general in the Appalachian region than in many other sections of the country. Practically all plants producing a million board feet or more of hardwoods per year and many producing less have edgers. In the case of the small pine mills, however, it is still common practice to square-edge boards on the head-saw, since the logs are frequently "sawed alive," and there is less opportunity for raising the grade by edging boards individually.

Hardwood lumbermen often refer to trimming as "equalizing," because its purpose is to cut the ends of a board square while reducing the piece to standard length. Two-saw trimmers are used. Trimming in the sense of cutting a board into two or more pieces to raise the grade of a portion is practiced only under certain softwood grading rules. Mill-run lumber from small mills is usually sold untrimmed. In general, trimmers are found only at the bandmills and at a few of the better-equipped circular mills.

Planing mill equipment: In comparison with softwoods, very little hardwood lumber is used in general construction. Chief consumers of hardwood cutting grades are furniture plants and other remanufacturers. For this reason the greater part of the shipments is rough air-dried lumber, and some of the largest mills have no facilities for surfacing. Nevertheless, 52 of the bandmills and many of the larger circulars have planers. Several also have timber sizers, but, with four or five exceptions, these are not intended for use with heavy timbers. In addition, 27 bandmills and several circulars have resaws, chiefly for use in the manufacture of dimension and of flooring from flitch.

Dry kilns: Since most hardwood lumber is shipped air-dried, there is less need for dry kilns at sawmills than in some other regions. As of January 1, 1943, there were 209 kilns on record with a combined holding capacity of 9,254 thousand board feet of 1-inch lumber (table 4). Two-thirds of these were compartment kilns, but progressive kilns furnished 55 percent of the capacity. Practically all were of the forced circulation type, but only half had automatic controls. Most of the dry kilns were located at large sawmills or at smaller plants cutting considerable quantities of yellow pine.

Table 4. - Dry kilns at sawmills, 1943.

States	Mills with kilns	Kilns	Holding capacity*
	Number	Number	M bd.ft.
Georgia	-	-	-
So. Carolina	4	8	273
Tennessee	15	62	2,689
No. Carolina	14	31	1,080
Virginia	11	41	1,915
Kentucky	3	9	346
West Virginia	13	58	2,951
Maryland	-	-	-
Total	60	209	9,254

*1" lumber on 1" stickers.

Power: It has been said that the most notable thing about sawmill power is the lack of it. This was especially true of portable mills in the days when steam was the only type of portable power. Transportation conditions were such that the weight of machinery had to be kept at a minimum so operators tended to purchase light-weight boilers that hardly met minimum requirements. In addition, much of the equipment was not designed primarily for sawmill use. Even today, boiler-mounted engines, and in some localities traction engines, power many small mills. These engines seldom develop more than 25 horsepower, frequently operating at 15 to 20 depending upon age and permissible boiler pressures. This is barely sufficient to drive an edger-equipped mill sawing average-sized logs. Objections to steam as a source of portable power do not apply to most stationary installations, however, and steam is standard for the larger sawmill plants. Altogether about 30 percent of the mills employ this kind of power.

Portable steam engines are gradually being replaced by various types of internal combustion engines. Farm tractors and power units together power about 50 percent of the small mills. The latter are very popular and are available in gasoline, kerosene, or Diesel models, and in horsepowers exceeding 100. Approximately 2,100 are now in use. Although somewhat less dependable than steam and more expensive to maintain, the first cost of power units is less, and they do not require a constant water supply or a full-time fireman.

Auto engines of six or eight cylinders drive 15 percent of the smallest sawmills, and very successfully. Fuel consumption is greater than with power units of comparable power and the working life short, but the replacement cost including labor is only $75 to $100. In West Virginia both auto engines and the smaller power units are sometimes run on natural gas, the reported fuel costs averaging 19 cents per thousand board feet.

The remaining mills depend upon electric motors and waterpower. Where the rates are not prohibitive, electricity appears to be the ideal type of power, and its use will undoubtedly expand. Some of the advantages claimed for electric-drive over shaft and belt drive are 15 percent greater efficiency through reduction of slippage and friction, reduced maintenance costs due to the elimination of much belting and shafting and many bearings, boxes, and hangers, reduced labor costs, and reduced fire risk.

Table 5. - Types of power used at sawmills, June 1944.*

Annual production class	Number of mills					
	Power unit	Steam	Auto engine	Farm tractors	Electric	Water
M bd.ft.	Percent	Percent	Percent	Percent	Percent	Percent
50 - 499	38	26	20	14	1	1
500 - 999	51	32	12	3	2	Negl.
1,000 - 4,999	56	40	1	Negl.	3	-
5,000+	-	97	-	-	3	-
All mills	41	29	17	11	1	1

*Based on 285 mill sample.

Transportation of Logs and Lumber

Logging railroads: The roughest sections of the Appalachian region could not have been logged economically without railroads, and this form of transportation came into extensive use. As the original timber was removed, however, the logging railroads gradually disappeared. About 20 active railroad logging operations remained in 1942, accounting for less than 10 percent of the total volume of logs transported in that year. At several of the mills represented, railroad logs were supplemented by logs delivered via truck or common carrier railroad.

Trucks: With the exception of those delivered by rail or skidded directly to portable sawmills, practically all sawlogs are now hauled by truck. Trucks are likewise important in the movement of lumber, and it has been estimated that more than 90 percent of production depends upon truck transportation at some point between stump and market.

The lumber manufacturers of this region own or hold under contract about 8,000 trucks. This fleet is characterized by the comparatively large proportion of medium to heavy vehicles (40 percent are two tons or heavier) and the absence of semi-trailers except for cross-country lumber hauling.

Skidding: Logging railroads and truck roads tend to follow the main hollows with few spurs. As a result, skidding distances are often extreme. Teams ordinarily yard the logs at points from which tows can be dragged to the skidways over cleared trails. Skidding is done chiefly with animals, but tractors are gradually replacing horses and mules where the nature of the terrain makes their use practicable. Crawler tractors have proved particularly versatile. Equipped with winches and dozer blades, they move heavy equipment, build access roads and railroad grades, and skid and load logs.

On rough chances cableway systems are occasionally employed, and on some operations single-line skidders snake in logs from distances as great as 2,500 feet.

Employment

Number of employees and total employment: Accurate statistics of employment are not available. However, the estimates presented in table 6 are based on weighted averages of employment at more than 100 mills and are believed to be approximately correct. It is recognized that 1942 was an abnormal year. Production exceeded that of any year since 1929 although crews were 11 percent short of full strength.

Table 6. - Sawmill employment, 1942.

Annual production class	Operating mills	Employees per average mill	Total employees*	Total man-days worked
M bd.ft.	Number	Number	Number	Number
1 - 49	1,700	3	5,100	102,000
50 - 499	3,315	5	16,600	1,492,000
500 - 999	578	14	8,100	1,133,000
1,000 - 4,999	297	38	9,600	1,689,600
5,000+	36	150	5,400	1,458,000
All mills	5,926	8	44,800	5,874,600

*Full-time basis. No allowance is made for turnover.

Part-time workers: Mention has already been made of the intermittent character of small mill operation. For instance, the work year of the smallest producing mills probably averages no more than three weeks and that of the next larger class about ten weeks. It does not necessarily follow that employees of these mills are part-time lumber workers, for many can work full time by moving from job to job. To some extent this is done, but apparently the larger number of men devote a portion of each year to other employment such as agriculture and mining. As a matter of fact, at least one-fourth of small mill owners and workers derive their principal income from occupations other than lumbering.

Even the largest year-round lumber operations depend to a considerable extent upon temporary employees to fill the less skilled positions. A large proportion of these workers are from small subsistence farms, and the labor supply, therefore, varies with the seasons, being most abundant during late fall and winter.

WARTIME LUMBER PRODUCTION

1942 Production

Lumber production in the Appalachian hardwood region during 1942 was about 1.9 billion board feet, exceeding that of any year since 1929. Oak made up 37 percent of the total volume, yellow pine 23 percent, yellowpoplar 10 percent, and the remaining 30 percent was composed of about 20 different species. Appalachian lumber production amounted to only 5 percent of the total United States production, but 19 percent of all the hardwood lumber came from the region.

By species: About 32 percent of the lumber produced was softwoods, chiefly yellow pine. Most of this pine was produced in southeastern Tennessee and the tier of counties east of the Blue Ridge. The latter area, although primarily pine territory, was included in the OPA region to avoid omitting the hardwoods of the eastern mountain slopes. Most of the redcedar was sawed in Tennessee and Kentucky, and practically all of the spruce and fir was cut in West Virginia. North Carolina led in the production of white pine, followed by Virginia and Tennessee. Hemlock was produced throughout the region, chiefly by a few large companies.

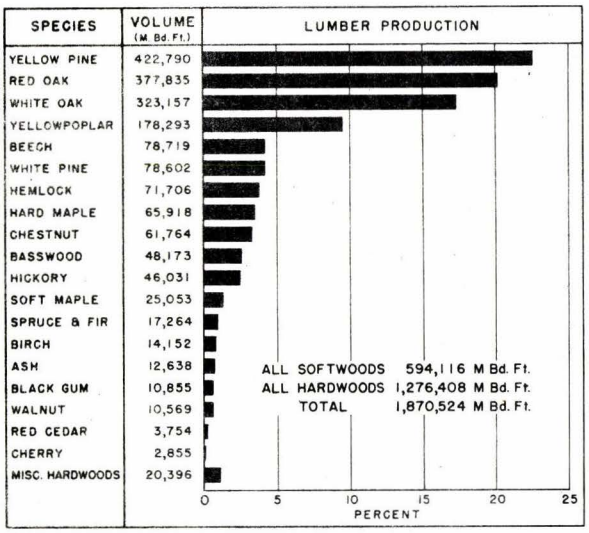


Figure 4. - Lumber production by species in the Appalachian hardwood region, 1942.

Because the OPA price boundaries include many small pine mills the production of hardwood lumber amounted to only 68 percent of the total 1942 cut. Over most of the region the proportion of hardwood was much greater and many mills cut no softwood at all. Figure 4 shows the production of species in detail, and figure 15 to 22 in the Appendix delineate the areas most prominent in the production of each.

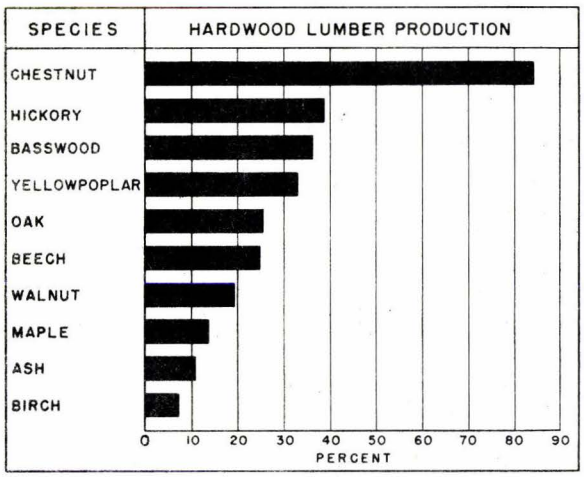


Figure 5. - Proportion of United States production of selected hardwood species sawed in the Appalachian hardwood region, 1942.

The Appalachian region is justly famous for its production of hardwood lumber. Although the entire area is estimated to contain only 31 million acres of forest, 7 percent of the commercial forest land in the nation, it accounts for a large part of the national production of several species of hardwoods (figure 5). Nearly all the chestnut lumber is cut here and over one-third of the hickory, basswood, and yellowpoplar. Production figures do not tell the whole story, however, for many of the Appalachian hardwoods are considered superior in quality to those grown elsewhere. For instance, practically all of the soft-textured old growth yellowpoplar comes from this region.

By production class: Eighty-two percent of the lumber was cut by small mills, most of them averaging less than 10 thousand feet per day (figure 6). In contrast, over the entire United States similar small mills produced only 45 percent of the lumber.

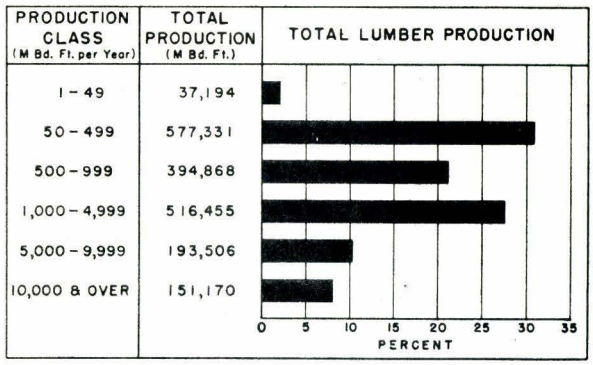


Figure 6. - Lumber production by mill class in the Appalachian hardwood region, 1942.

If production by species were tabulated separately for large and small mills, significant differences would appear. For instance, it could be seen that the small mills sawed most of the yellow pine and a great deal of the white pine. Large plants, even in pine producing areas, operated chiefly in hardwoods, although they did produce 98 percent of the spruce and fir. Hardwood production at small mills included the bulk of the less valuable species such as beech, hickory, and black gum, while large mills produced most of the ash, basswood, cherry, old growth yellowpoplar, and other high-value woods. This is merely a reflection of timber supply. Most of the larger tracts of good quality timber are operated by band mills, and circular mills depend largely upon partially cut-over stands, young second growth, and scattered farm holdings. That large band mills produced only 17 percent of the lumber is indicative of the scarcity of extensive acreages of high grade operable timber.

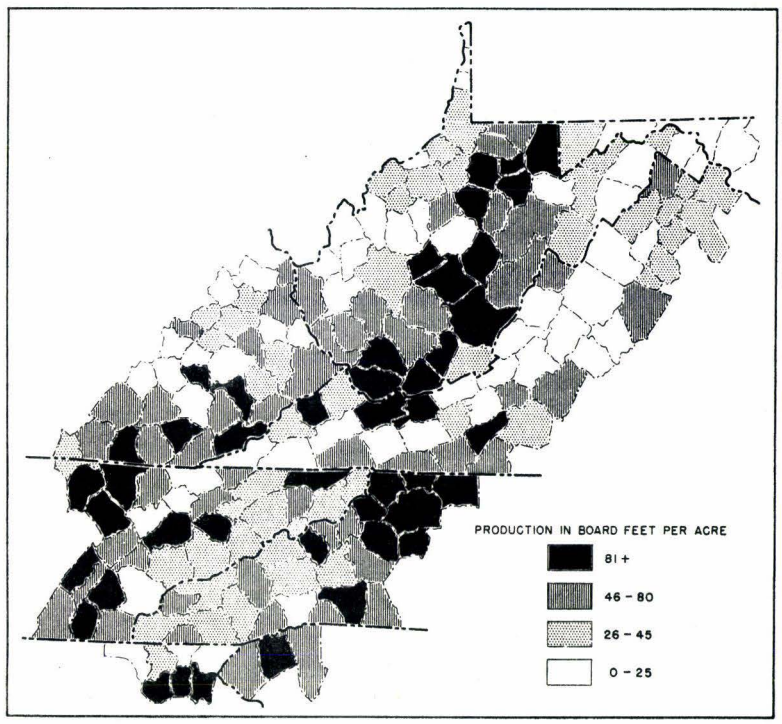


Figure 7. - Production of lumber per average acre of forest land by counties, 1942.

By counties:[1/] Intensity of lumbering varies considerably over the region. This is demonstrated in figure 7 which shows by counties the approximate output of lumber per average acre of forest land. In a general way it indicates the present suitability of various parts of the region to lumbering activity, since it reflects timber supplies, local market conditions, and local need for forest employment. However, some of the counties now showing below average production will be leaders in the future, particularly those located within the boundaries of the national forests.

1/See table A-2 in the Appendix for the number of active sawmills and lumber production by counties.

Reference has already been made to figures 15 to 22 in the Appendix showing the counties leading in the production of certain species. They indicate that industries or war agencies in need of yellowpoplar, maple, hickory, birch, beech, basswood, or ash from the Appalachians should turn first to certain counties in West Virginia. Counties in other states of the region lead in the production of other species.

Value of lumber produced: The market value of the 1942 production was slightly more than $69,000,000, f.o.b. mills, on the basis of average prices reported to the Bureau of the Census. The sales realization per thousand board feet averaged $37.06 for all species and products including mine materials, crossties, and other low grade items. Similar values for bandmills and other quality producers published by the J. C. West Lumber Service Corporation indicate an average gross realization of $54.43 for this class of operators.

1943 Production

The 1943 estimate of lumber production presented here is the sum of monthly estimates made for the War Production Board. It is not as accurate as the 1942 estimate, which was based upon reports from all mills operating during that year, but because it is based upon accurate reports from several hundred representative sample mills it is a very close approximation of actual production.

Table 7. - Lumber production by species in 1943 compared with 1942.

Species	Production 1943	Proportion of total cut	
		1943	1942
	Million bd.ft.	Percent	Percent
Red oak	503.6	23.5	20.2
White oak	430.7	20.1	17.3
Yellow pine	396.4	18.5	22.6
Yellowpoplar	205.7	9.6	9.5
White pine	122.1	5.7	4.2
Hemlock	94.3	4.4	3.8
Beech	64.3	3.0	4.2
Hard maple	62.1	2.9	3.5
Chestnut	57.9	2.7	3.3
Hickory	55.7	2.6	2.5
Basswood	47.1	2.2	2.6
Soft maple	23.6	1.1	1.3
Black gum	15.0	0.7	0.6
Spruce-fir	12.9	0.6	0.9
Birch	10.7	0.5	0.8
Ash	10.7	0.5	0.7
Walnut	8.6	0.4	0.6
Redcedar	2.1	0.1	0.2
Cherry	2.1	0.1	0.1
Misc. hdwds.	17.2	0.8	1.1
All softwoods	627.8	29.2	31.8
All hardwoods	1,515.0	70.8	68.2
Total	2,142.8	100.0	100.0

The estimated production during 1943 was 2.1 billion board feet, an increase of 15 percent over 1942. This increase was achieved in spite of war-induced obstacles which reduced output over the nation by 4.7 percent and in some regions by more than 15 percent.

By species: In 1943 there was some shift in the pattern of lumber production by species (table 7). Ceiling price differentials lead to the production of more oak at the expense of pine. The demand for box lumber and special war items

such as floats for Navy flares resulted in a noticeable increase in the cut of white pine, particularly in North Carolina. Hemlock lumber cut from the better grade logs is entirely suitable for many war uses, flooring for Signal Corps radio huts is one example, and production increased considerably in 1943.

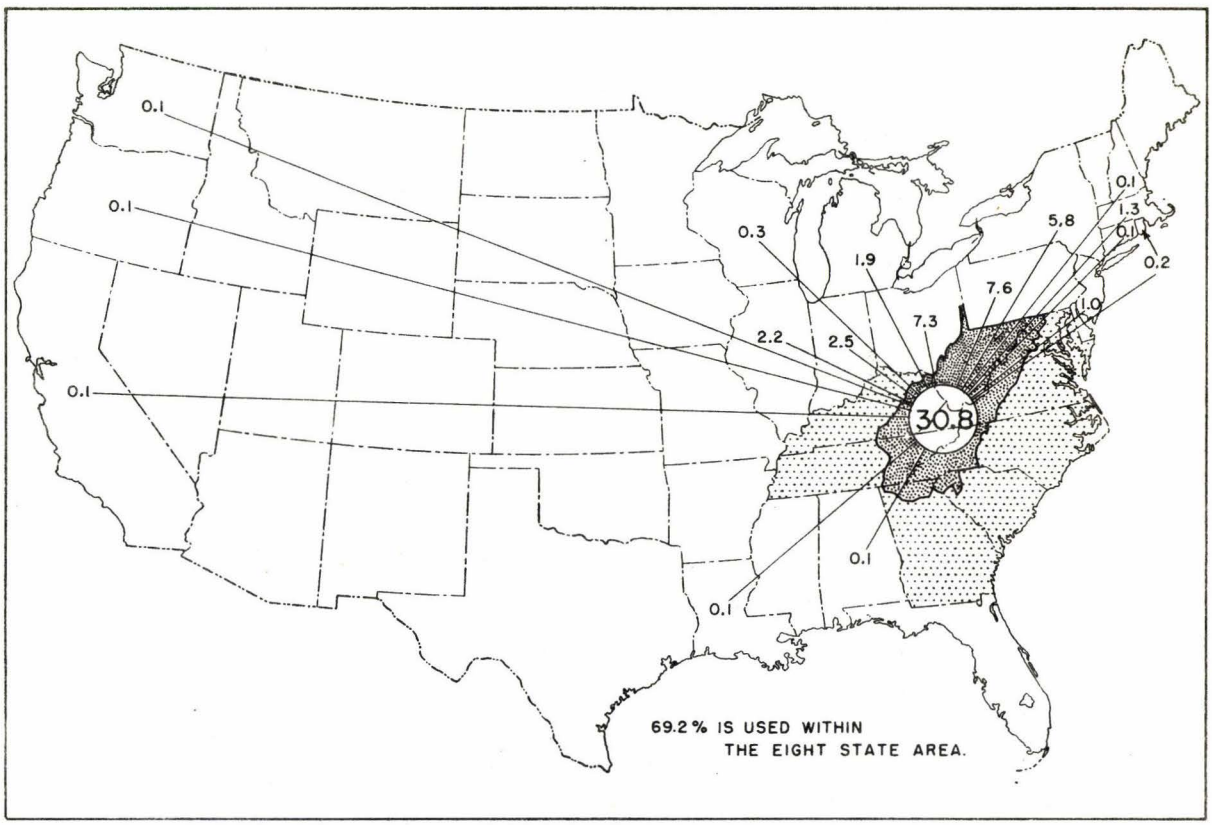


Figure 8. - Distribution of lumber produced in the Appalachian hardwood region, 1943.

Distribution of lumber shipments: There is no information as to the volume of lumber used within the region, but nearly 70 percent was consumed within the eight states which contain the region. Nevertheless, during 1943 lumber was shipped into all of the 40 remaining states and to several foreign countries. Figure 8 shows the percentage of the total shipped to each of the major consuming states. Data on foreign shipments are not available since normal exports have been interrupted by the war. Undoubtedly, a sizable portion of the lumber shipped to coastal points was destined for reshipment abroad under lend-lease or for the use of our armed forces.

Trends in Production

As a group the lumbermen of the Appalachian region were able to produce more lumber in 1943 than in 1942, and the 1944 cut to date is slightly greater than for the same period of 1943.

Table 8. - Lumber production by quarters in the Appalachian hardwood region.

Year	First	Second	Third	Fourth	Total
	Million bd. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.
1942	402	515	539	415	1,871
1943	463	554	571	555	2,143
1944	466	563	-	-	-

Seasonal trends: A month-by-month comparison of production is presented in figure 9. The differences in the shapes of the curves reflect the varying weather conditions which largely determine seasonal trends of production. For example, May and November 1942 were wet months, whereas the same months of 1943 were favorable. In the last quarter of 1943 weather conditions were much better than in the last quarter of 1942, and as a result production was one-third greater. Much of the increase in the 1943 cut can be attributed to the excellent logging weather that prevailed during the latter part of the year.

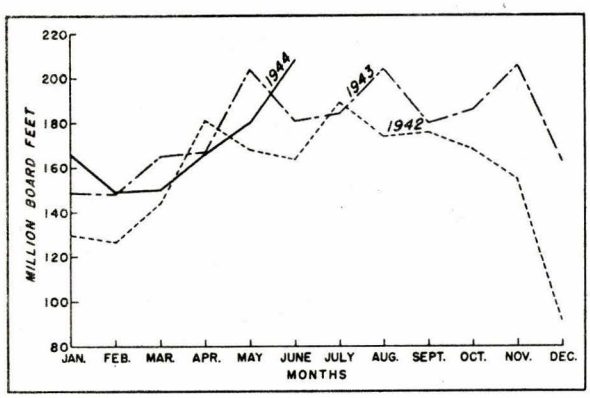


Figure 9. - Trend in lumber production, 1942, 1943, and first six months of 1944.

A second factor influencing the seasonal trend of production is the availability of part-time labor from farms. This factor depresses production during March-April, June-July, and September-October, the periods of maximum farm activity. During the winter the extra manpower tends to counteract the influence of bad weather and top production is attained in the months when labor supply and weather are both favorable. The peak of November 1943 is a striking illustration of the effects of a period of ideal weather during a slack agricultural season.

Trends by production classes: In most important lumber regions production has declined since 1942, but this has not been true in the Appalachian region. Chief credit is due the small producers, the size of whose operations is more nearly in balance with wartime supplies of labor, timber, and equipment than that of the large manufacturers. A comparison of 1942 and 1943 production for over 1,100 representative identical mills shows that those sawing less than one million board feet in 1942 increased production about 21 percent in 1943, those sawing one million to five million board feet decreased 5 percent, while those sawing over five million board feet decreased 18 percent.

The mills that cut less than a million feet in 1942 were able to increase production merely by operating longer than their 1942 average of two months, and there were more of them in operation. In addition to the patriotic motive, which was a definite contributing factor, small mill operators produced more because lumber ceiling prices and the unlimited demand for even the poorest grades gave them a better-than-usual opportunity for

profit, even in the face of higher costs. One million to five million foot mills avoided sharp declines of production by efficient on-the-ground management. Examples of good management included the operator who planked his woods roads to insure all-weather hauling, and the operator who adjusted his sawmill crew and working hours so local labor could work part of each day on farms and still keep the mill running at full capacity.

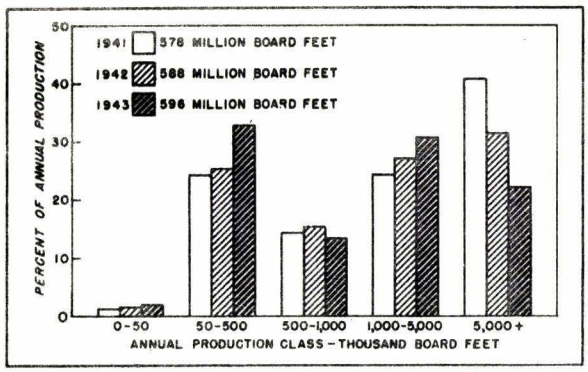


Figure 10. - Trend in lumber production by mill production classes, West Virginia, 1941, 1942, and 1943.

The full effect of all the factors tending to reduce production has been felt by the large band mills. As a result, their contribution to total production has gradually declined. So far, the smaller mills have more than made up the difference in volume but not in quality of products. This shift of production from large to small mills is best illustrated in West Virginia where mills with annual outputs of more than five million feet cut two-fifths of the lumber in 1941 and only one-fifth in 1943 (figure 10).

PRODUCTION AND DISTRIBUTION OF SMALL MILL LUMBER

The importance of small sawmills is obvious from the production record. Their value to the economy of the region is indicated by the fact they provide at least part-time employment for nearly 40,000 individuals. Yet, in the formulation of emergency plans affecting the lumber industry small mill characteristics and practices are frequently ignored.

The following brief review of the production, distribution, and sale of lumber at small Appalachian mills is based largely on data obtained during June and July 1944 from 171 sawmills and 12 concentration yards. The information presented applies specifically to this period and to operations producing less than 2 million board feet annually, but is generally applicable to all small operations.

Character of the Industry

Small mill operation is ordinarily on a part-time or seasonal basis, many owners and most workers devoting a portion of each year to other employment such as agriculture or coal mining. At least one-quarter derive their principal income from occupations other than lumbering. A large number of mill owners are farmers or country storekeepers who produce lumber commercially only when it is profitable to do so. At other times they shut down or saw only for neighborhood consumption. Such men do not consider themselves lumbermen, and therefore pay little or no attention to matters affecting the industry. Their knowledge of governmental orders is often gained second-hand from coal companies, concentration yards, and others to whom they sell, or third-hand from other sawmill men. The majority are

content to leave the responsibility for the legality of their transactions to the buyers.

This attitude of the average operator is not merely an expression of indifference but reflects his habitual dependence upon a small group of customers. In normal times excessive productive capacity promotes intense competition among the multitude of small mills. The usual result is a buyer's market dominated in many localities by one or two large lumber purchasers.

Production

Operating methods of small mills vary with size, location, and control of mill (see page 4 ff), and the species cut. Ordinarily, the larger hardwood mills manufacture quality lumber and ship in interstate commerce, whereas the smaller hardwood mills and most of the yellow pine operators produce mill-run products for local sale. Near coal fields, however, mine timbers and brattice lumber are the principal products of most mills regardless of size, and many plants operate under exclusive contract to collieries. In such areas even custom mill output is largely mine materials.

Sawmill equipment and general practices: Hardwood lumber is practically 100 percent square-edge, and many of the smallest mills are equipped with edgers. Cut-off saws also are commonly employed. Planers, on the other hand, are seldom operated in conjunction with sawmills except in the case of a few custom establishments. Dry kilns are even less frequently employed, but nearly 30 percent of the mills air-dry at least a portion of their grade lumber. Sorting of the product by species and sizes is not as common a practice as might be expected because of the predominance of mixed-lot sales.

Table 9. - Operations performed by hardwood sawmills.

Annual production class	Proportion of mills			
	Sorting	Air-drying	Surfacing	Mfr. small dimension
M bd.ft.	Percent	Percent	Percent	Percent
50 - 499	12	25	10	2
500 - 999	20	46	11	3
1,000 - 1,999	28	39	6	6
All mills	14	29	10	2

Machinery at yellow pine mills is usually limited to the bare essentials, for the nature of the timber tracts operated necessitates more or less frequent moves. Large continuous acreages of saw timber are rare, since small land ownerships prevail in the principal pine-producing areas. In addition, pine frequently occurs in mixture with hardwoods which are inoperable because of small size or defectiveness. As a result, the average cut per "yard" or mill set is about 30 thousand board feet.

Portability being a prime requisite, a typical pine mill consists of a lightweight husk, frame, track, and carriage, and a short line of rollers. Log turners, edgers, trimmers, cut-off saws, and other extra equipment found at some hardwood mills are seldom used. Although practically 100 percent of the lumber is square-edge, the edging is customarily done on the headsaw. Ordinarily, no lumber is trimmed.

In contrast to hardwood practice, sorting of the product is common, since most mills are sawing against orders for specific sizes. Where lumber is dried the various sizes are separated in the piles, but 85 percent of the mills deliver their output green.

The manufacture of small dimension in the Appalachian region is centralized in a few large plants. Sawmills manufacturing this type of material tend to specialize in handle or shunt-pole blanks.

Hardwood products: Grade lumber is sawed at 49 percent of the hardwood mills and amounts to 56 percent of the total production. Approximately 6 percent is brattice boards. Mine timbers and ties, although produced by comparatively few mills, take second rank because they are often the sole product of those mills. Structural dimension (including all grades of car stock, bridge and crossing plank, sound square-edge, common dimension, oil rig and tipple timbers, and other bill items) is third in importance. It is followed by railroad ties (cross, switch, and bridge). Industrial blocking, walnut flitch, small dimension, and all other hardwood products combined form an insignificant volume.

Table 10. - Distribution of hardwood mills and production by products.

Type of mill	Product									
	Grade lumber		Mine timbers		Structural dimension		RR ties		Blocking and other	
	No. mills	Prod.	No. mills	Prod.	No. mills	Prod.	No. mills	Prod.	No. mills	Prod.
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Independent	50	64	10	12	21	14	17	9	2	1
Contract	50	24	13	44	14	12	21	20	2	Negl.
Custom	41	48	13	28	35	23	6	1	1	Negl.
All mills	49	56	11	19	22	14	16	10	2	1

Thicknesses of hardwood grade lumber: The independents produce grade lumber in a full range of thicknesses, but 75 percent of their output is 4/4 stock. Contract and custom production is limited to fewer thicknesses with 4/4 constituting about the same proportion of the total. In one section of Virginia 3/4-inch oak crating is an item.

Table 11. - Thicknesses of hardwood grade lumber produced.

Type of mill	Grade lumber production							
	3/4	4/4	5/4	6/4	8/4	10/4	12/4	16/4
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Independent	1	75	6	10	8	Negl.	Negl.	Negl.
Contract	2	86	-	2	10	-	-	-
Custom	-	77	11	-	12	-	-	-
All mills	1	75	6	9	9	Negl.	Negl.	Negl.

Yellow pine products: Boards and "framing" are the usual products of small pine mills. In Kentucky and West Virginia they are practically the only products and in the region as a whole constitute 93 percent of the production. However, along the Blue Ridge from Virginia to Georgia production is more diversified. From North Carolina south an appreciable volume of timbers are sawed, in South Carolina and Georgia paving block stock is produced, and in the dense-grain pine areas of the states last named crossarms and car lumber are added products.

Table 12. - Principal yellow pine products manufactured.

Producing area	Total production					
	Boards	Dimension	Crossarms	Small timbers	Car lumber	Large timbers & misc.
	Percent	Percent	Percent	Percent	Percent	Percent
Kentucky-W.Virginia	41	59	Negl.	Negl.	Negl.	Negl.
Virginia-N.Carolina	43	54	Negl.	2	Negl.	1
S.Carolina-Georgia	68	16	8	2	5	1
All mills	52	41	2	2	2	1

Production costs: It would be very difficult to obtain accurate cost data for small mills from the inadequate records kept by most operators. However, the operators possess an approximate knowledge of their direct costs of operation such as stumpage, labor, fuel, feed, tools, and truck expense. Table 13 presents the averaged costs of 27 yellow pine producers.

Table 13. - Cost of producing yellow pine lumber at small Appalachian sawmills.

Item	Average cost 1/	Range
	Dollars	Dollars
Stumpage	9.25	5.00 - 15.00
Timber cutting	3.75	2.50 - 4.50
Skidding & hauling	6.00	2.00 - 15.12
Total log cost	19.00	13.00 - 25.12
Sawing	7.15	4.00 - 10.00
Lumber piling & hauling	3.50	2.00 - 7.00
Total mfg. cost	10.65	7.00 - 15.00
Total cost	29.65	23.00 - 34.00

1/Does not allow for depreciation of equipment, maintenance, taxes, and other overhead estimated at $2.75 to $3.00 per thousand board feet.

Concentration yard managers sometimes estimate small pine mill costs at less than those presented above, but two yards with mills of their own report costs of $31.81 and $28.79. The latter figure applies to six months' production totaling 178,169 board feet and was based on the following expenditures:

		Percent
Fuel for power unit	$ 376.35	7
Labor	2200.54	43
Feed	195.19	4
Timber @ 7.50 per M	1336.27	26
Truck hauling	534.51	10
Truck repairs	200.00	4
Tires, tools, other repairs, etc.	287.34	6
Total	$5130.20	100

The cost of producing hardwood lumber is believed to be approximately the same as that of pine. Logging and sawing are more expensive, but these increases are counteracted by the present lower price of hardwood stumpage.

Distribution

Small mill markets and selling habits have not undergone the constant alteration which the war has brought to larger producers. Thus, 80 percent of the hardwood operators report no change of customers during the past twelve months, and the majority of the pine operators serve the same markets as before the war. This does not necessarily indicate that the uses of the lumber remain the same, for only a portion is customarily channeled directly from producer to ultimate consumer. In general, the movement of small mill lumber beyond local markets requires the services of a middleman.

Hardwood markets: At present, mines, quarries, and oil and gas producers are the largest consumers of hardwood lumber, taking 28 percent of the total output. Wholesalers, including distribution yards, a few large mills, and jobbers, are the next most important outlet (16 percent), a large portion of the quality cutting grades and dimension passing through their hands. Wholesale distribution yards, by kiln drying and surfacing or by arranging for these operations in transit, take over to a considerable extent the functions fulfilled in yellow pine producing areas by concentration yards. Concentrators in this sense are rare in the hardwood industry, most of them having no processing equipment and functioning as little more than loading yards. Many specialize in crossties and timbers. Nevertheless, they handle 15 percent of the hardwood production, mostly from smaller mills in Virginia and Tennessee. Table 14 shows the complete distribution of mills and production by markets.

Table 14. - Distribution of hardwood sawmills and production by markets.

Customer	Number of mills	Production
	Percent	Percent
Mines, quarries, oil and gas producers	16	28
Wholesalers	10	16
Concentration yards	12	15
Farmers, retail sales	19	8
Flooring and dimension manufacturers	7	7
Railroads	13	6
U. S. Government	2	5
Furniture manufacturers	7	4
Pallet manufacturers	2	3
Shipyards	1	2
Box manufacturers	1	1
Vehicle manufacturers	2	1
Retail yards	3	1
Others	5	3
Total	100	100

Method of selling hardwood grade lumber: Of the independent hardwood producers, 56 percent sell their grade lumber on grade, the volume involved amounting to 78 percent of the grade lumber produced. An additional 37 percent of the operators sell mill run, but since these mills are small the volume is only 19 percent of the total. The remaining 7 percent of the mills, which produce but 3 percent of the grade lumber, separate the log run material from the #3 Common.

Table 15. - Distribution of hardwood mills and grade lumber production by method of selling.

	No. mills	Production
	Percent	Percent
N.H.L.A. cutting grades	56	78
Log run		
Species separate	2	Negl.
Species mixed	5	3
Mill run		
Species separate	5	1
Species mixed	32	18
Total	100	100

The sale of lumber on grade, buyer's inspection, is now common practice. A year ago 25 percent of the mills now selling on grade marketed only mill-run lumber. Almost without exception, the mills that made the shift now sell on buyer's grade. Of all producers now selling graded lumber about 75 percent of those in the 50-499 thousand board feet per year class, 35 percent of those in the 500-999 class, and 25 percent of those in the 1,000-1,999 class market in this way. The principal buyers involved are as follows:

Buyer	Percent of mills selling on buyer's grade
Furniture and flooring mfrs.	40
Wholesalers	33
Concentration yards	13
Pallet mfrs.	8
Retail yards	3
Misc. mfrs.	3
	100

Yellow pine markets: The distribution of Appalachian yellow pine lumber follows a simpler pattern than that of the hardwoods. This is due largely to the fewer products and sizes involved and the heavy concentration of pine production in certain areas. These conditions have made possible the establishment of centralized markets such as concentration yards, yards that carry on a mixed retail-wholesale business, and box plants. These buyers receive approximately 60 percent of all the yellow pine produced by small mills and nearly 100 percent in the principal pine-producing areas in which their activities are centered. (See figure 21 in Appendix.) Competition for rough lumber in pine areas is now intense with the concentration yards apparently at a disadvantage, for in 1943 their lumber receipts were only 65 percent of normal. Other competition in these counties is limited to such relatively minor lumber consumers as cotton and paper mills, pallet manufacturers, furniture plants (for crating), wood-preserving plants, and millwork companies.

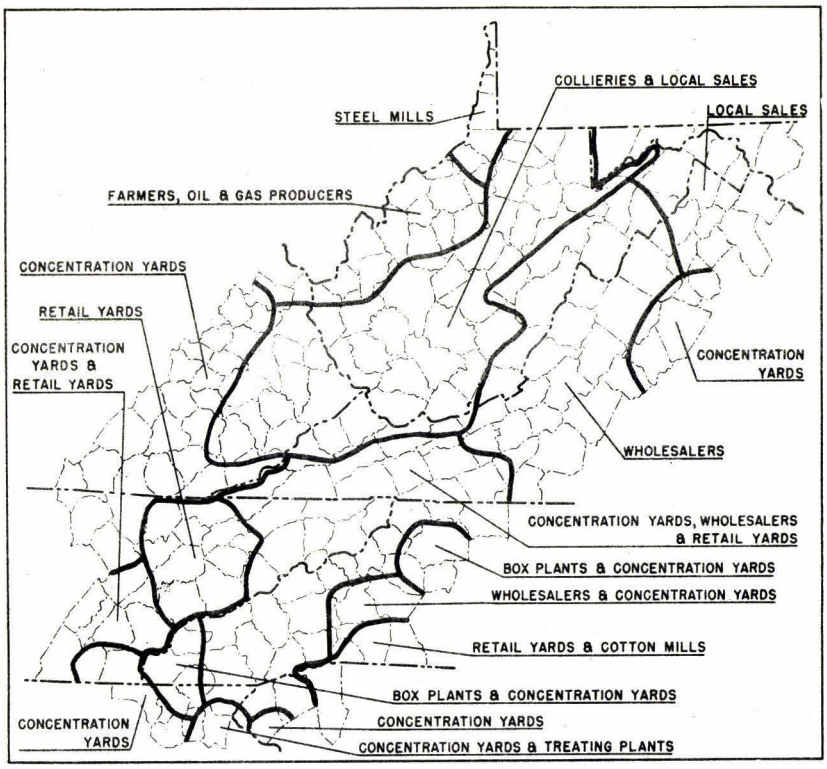


Figure 11. - Principal markets for yellow pine lumber produced by small Appalachian sawmills, July 1944.

In areas where pine does not constitute so large a portion of the production, centralized markets give way to wholesalers and to strictly retail yards. Finally, where yellow pine production is small and scattered, as in most of West Virginia and adjacent counties of Kentucky, it is sold locally for industrial use or for small construction, often in mixture with hemlock or hardwoods. Figure 11 shows the principal marketing areas and table 16 the distribution of the sawmills by customers served. Local sales, usually at near-retail prices, divert large volumes of lumber from essential war use throughout the region and are believed to be the chief source of supply to the "black market."

Table 16. - Distribution of pine sawmills by markets.

Customer	Proportion of mills
	Percent
Concentration yards	33
Retail & retail-wholesale yards	16
Local sales	14
Box manufacturers	12
Wholesalers	9
Cotton mills	4
Pallet manufacturers	3
Others	9
Total	100

Method of selling yellow pine lumber: Approximately 90 percent of the small mills sell their pine lumber log run. The 10 percent selling on grade can be divided into 3 percent with authority under MPR 19A to sell on S.P.I.B. specifications and 7 percent without such authorization. Grading at many of the latter mills consists of separating the clear stock for sale at $40 or more per thousand board feet. The knotty pine is then sold for $32.

Prices

The prices now received for small mill products are about one-third above those prevailing before the war. Most of the increase occurred prior to the establishment of dollars-and-cents maximum prices by the Office of Price Administration (yellow pine in September 1941, and hardwoods in June 1942). The general price trend under the ceilings has been upward, but, except for mill run products which often sell above ceiling, the increases have not kept pace with those allowed by subsequent revisions of the price regulations.

Hardwood sales realization: The average gross sales realization from hardwood products is shown in table 17. For purposes of comparison two sets of values are given. The first represents the actual prices received at the point of delivery, whether f.o.b. cars or hauled to destination by truck. The second is the average realization f.o.b. mill, arrived at by deducting estimated hauling costs wherever such costs are borne by the seller. All realization values are weighted by numbers of producers and volumes produced to approximate regional averages as nearly as possible. However, the average sales realization varies with mill size, the larger producers receiving more for their lumber than the small ones. To some extent this price differential represents a difference in the quality of production, but it also reflects the greater bargaining power of the larger producers. Table 18 compares the average realization f.o.b. mill by mill classes.

Table 17. - Average hardwood sales realization by products.

Product	Basis		Gross realization per M bd.ft. point of delivery	Gross realization per M bd.ft. f.o.b. mill
	Mills	Volume		
	No.	M bd.ft.	Dollars	Dollars
Grade lumber:				
On grade - dry	30	1,250	47.61	44.00
On grade - green	18	425	44.46	38.71
On grade - average	48	1,675	46.25	41.72
Log run	4	37	50.27	48.94
Mill run	20	363	38.60	34.29
All grade lumber	72	2,075	43.84	39.60
Other products:				
Ties 1/	25	250	32.88	28.76
Ind. blocking	3	33	28.18	26.54
Structural dim. 2/	28	367	49.27	44.86
Mine timbers	19	619	32.44	29.56
All products	72	3,344	41.73	37.65

1/Including cross, switch, and bridge ties.
2/Including all grades of car stock, bridge and crossing plank, sound square edge, common dimension, oil rig and tipple timbers, and other bill items.

Table 18. - Average hardwood sales realization per thousand board feet f.o.b. mill by annual production classes.

Product	Annual production class - M bd.ft.		
	50-499	500-999	1,000-1,999
	Dollars	Dollars	Dollars
Grade lumber:			
On grade - dry	40.22	50.15	49.87
On grade - green	38.91	38.71	36.54
On grade - average	39.57	47.46	45.40
Log run	48.94	-	-
Mill run	34.61	35.07	21.00
All grade lumber	38.53	43.65	41.64
Other products:			
Ties	28.62	25.85	33.55
Ind. blocking	-	23.18	28.00
Structural dim.	42.44	45.97	65.88
Mine timbers	30.56	28.44	26.10
All products	36.97	38.84	41.12

Commissions paid by hardwood producers: Another possible explanation of the price disparity between mill classes is the greater reliance of the larger mills on wholesalers and brokers whose market connections make better placement of the production possible. At present, 35 percent of the 1,000-1,999 thousand board feet per year mills pay commissions on all or part of their sales against 30 percent of the 500-999 mills and 10 percent of the 50-499 mills. These commissions are customarily either 6 or 8 percent.

Yellow pine sales realization: Table 19 shows the present average gross sales realization by products and the range of prices received. The highest prices prevail in Kentucky where log run pine sells for slightly more than mill run hardwoods. The lowest prices are received in southern North Carolina, although board realization is less in South Carolina and Georgia due to the refusal of most buyers to pay full board prices for the narrow side-cuts from crossarm stock. The $2 addition permitted in Virginia by Amendment 1 to MPR 19A resulted in a greater average realization for dimension than in nearby counties of North Carolina, but no significant differences were noted for other products.

Table 19. - Average gross sales realization from log run yellow pine lumber and the range of prices received.

Product	Average gross sales realization per MBF	Range of prices
	Dollars	Dollars
Boards	32.67	25.00 - 50.00
Dimension	32.66	29.00 - 50.00
Small timbers & blocking	37.01	35.00 - 45.00
Car decking	36.00	36.00
Crossarms	43.84	43.00 - 45.00
All products	33.13	

Transportation of Lumber

Only 10 percent of the mills are located on railroads, and not all the production of those is transported by rail. However, they are the larger producers in most cases, so approximately 85 percent of the total production is hauled away by truck. Table 20 shows the various methods by which lumber leaves the mills and the distribution of mills according to the method most commonly employed by each.

Table 20. - Distribution of mills by manner of shipping lumber.

Annual production class	Number of mills			
	Delivers to customer	Hauls to railroad	Pick-up by customer	Direct rail loading
M bd.ft.	Percent	Percent	Percent	Percent
50-499	76	8	14	2
500-999	65	28	6	1
1,000-1,999	56	17	Negl.	27
All mills	73	12	12	3

Hauling costs: Custom and contract operators who deliver their output ordinarily add a charge for hauling to their regular fees. Most independent operators bear at least a portion of the delivery cost themselves. For example, the ceiling prices of log run yellow pine lumber include a transportation allowance of $2.50, but the actual average cost to the operator is about $3.50.

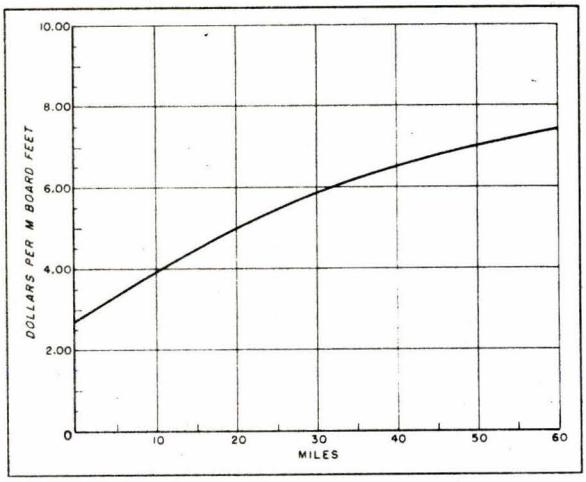


Figure 12. - Cost of hauling hardwood lumber by truck from small Appalachian mills. Basis--76 mills.

In the case of the independent hardwood producers, a charge for delivery is seldom made even though a nominal addition is permitted by applicable price regulations. Thus, 65 percent of the 3.3 million board feet of lumber included in the hardwood price sample was hauled to destination and 11 percent to a railroad loading-out point at the producers' expense. The remaining 24 percent was divided as follows: 14 percent loaded directly into cars, 6 percent delivered by truck and a charge made for the service, and 4 percent picked up by customers' trucks. Figure 12 indicates the average cost of trucking hardwood lumber any desired distance and served as the basis for the deductions made in table 17 to convert realization "at point of delivery" to realization f.o.b. mill. Table 21 shows for each hardwood product the average length of haul and the average cost as read from the curve. It will be noted in every case where data are available that the average distance hauled to a railroad loading-out point exceeds the average distance from mill to local customer.

Table 21. - Average length of truck haul and cost per thousand board feet.

Product	Hauled by mill to customer		Hauled by mill to railroad	
	Avg. length of haul	Avg. cost per MBF	Avg. length of haul	Avg. cost per MBF
	Miles	Dollars	Miles	Dollars
Grade lumber:				
On grade - dry	21.7	5.15	22.8	5.25
On grade - green	33.2	6.10	-	-
Log run	20.3	5.00	-	-
Mill run	24.3	5.35	30.0	5.85
Ties	14.6	4.45	20.7	5.05
Industrial blocking	6.0	3.50	30.0	5.85
Structural dimension	22.6	5.20	30.0	5.85
Mine timbers	29.3	5.80	-	-

PRODUCTION PROBLEMS

The region's production record is remarkable when considered in the light of the handicaps under which the industry has operated. Shortages of manpower and equipment, uncertain deliveries of operating supplies, and the complexities of the many governmental controls have all reacted against a high sustained rate of production.

Labor

Manpower shortage: The most serious problem has been that of manpower. There was a steady migration of lumber workers to better paying industries throughout 1941, and in 1942 this migration was accompanied by heavy losses of men to the expanding agricultural program and to the armed forces. By year's end most operations were short-handed, crews averaging 20 percent below full strength. Figure 13 shows the severity of the manpower shortage during 1943 and the first half of 1944, and brings out the fact that woods crews have been hardest hit. The chief shortage has been of timber cutters, teamsters, truck drivers, and tractor operators, with timber cutters most needed. It is now common practice to log small mills with the same crew that does the sawing, and very few large operators are consistently able to produce enough logs for more than 40 hours operation per week.

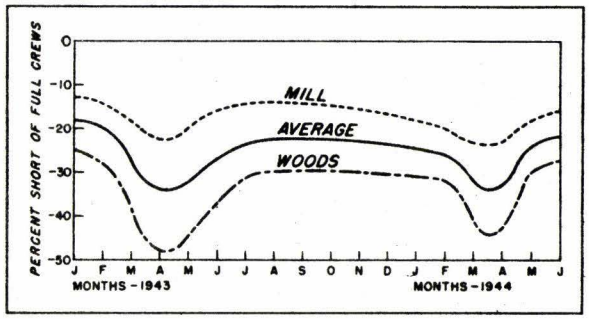


Figure 13. - Shortage of manpower during 1943 and the first half of 1944.

As of January 1, 1944, after three months of very nearly ideal weather, log inventories were 61 percent below normal for the time of year as compared

to 55 percent below normal on October 1. This fact, better than any other, indicates the severity of the woods labor shortage. With log production thus curtailed mill crews, although 15 to 20 percent below full strength, have proved adequate in most cases. However, lack of yardmen forces some plants to close down whenever lumber is to be loaded for shipment.

Table 22. - Normal January log inventories compared with those of January 1, 1944.

Item	Normal inventories			Inventories Jan. 1, 1944			Below normal
	Mill	Woods	Total	Mill	Woods	Total	
	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	Percent
Small mills*	20,426	50,601	71,027	12,942	18,156	31,098	56
Large mills	7,595	30,713	38,308	3,329	8,297	11,626	70
Total	28,021	81,314	109,335	16,271	26,453	42,724	61

*Small mills--those producing from 1 million to 5 million board feet annually.

Protracted periods unfavorable to logging are seldom experienced during the winter in this region. In ordinary years a 10-days' log supply is an adequate hedge against stoppages of woods work due to weather. The larger inventories normally accumulated during late autumn by many full-time operators are intended to carry them not only through the winter but over the labor-short planting season as well. Failure to maintain an inventory until spring may result in considerable lost time at the mill, as demonstrated in table 23. In this case, the loss over a two-month period amounted to 35 percent of the planned schedule.

Table 23. - Effects of log shortage at an Appalachian mill, spring 1944.

Month	Actual production	Planned operating time	Loss due to lack of logs	
			Time	Production
	M bd.ft.	Hours	Hours	M bd.ft.
April	260	208	75	155
May	312	216	80	212
Total	572	424	155	367

Production summaries for three large bandmills illustrate the effects of gradual shrinkage in the size of logging crews. Mill #1 offers the most striking example. Production for the period 1936-1941 totaled 103,492,000 board feet, an average of 8,624,000 board feet every six months. Production in 1942 exceeded that of any previous year, the mill operating three shifts a day from January to July. In August 1942, one shift was cut off and a second in October. In June 1943, one side of the mill was shut down, and in November production ceased for lack of logs.

Table 24. - Lumber production of three selected bandmills, 1942-1943.

Period	Mill #1	Mill #2	Mill #3
	M bd.ft.	M bd.ft.	M bd.ft.
1st 6 months 1942	13,779	7,290	5,257
2nd 6 months 1942	9,402	6,544	5,046
1st 6 months 1943	7,444	5,041	3,917
2nd 6 months 1943	2,873	3,522	3,568

Table 25. - Shortage of manpower in the 4th quarter of 1943.

Annual production class	Short of full crew		
	Woods	Mill	Average
M bd.ft.	Percent	Percent	Percent
50 - 499	43	14	26
500 - 999	27	21	24
1,000 - 4,999	24	16	20
5,000+	19	15	17
All mills	31	16	23

At the end of 1943 the region's total labor deficiency was 23 percent or, in terms of actual manpower, slightly more than 11,000 men. Woods crews were estimated to be 31 percent and mill and yard crews 16 percent below the strength needed to meet normal production schedules. The shortages by mill production classes are shown in table 25. Except for seasonal fluctuations these shortages have persisted substantially unchanged through the first 6 months of 1944.

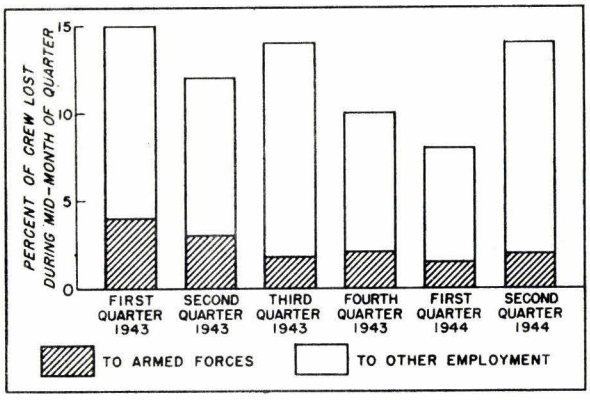


Figure 14. - Labor turnover by quarters during 1943 and the first half of 1944

Labor turnover: The rate of monthly labor turnover has fluctuated according to the seasons between 10 and 15 percent, but previous to April 1944 appeared to be declining. Responsible for the decline were a slowing rate of induction into the armed forces, enforcement of the War Manpower Commission's labor "freeze" order, and the fact that many war industries had passed their periods of peak employment. During the second quarter of 1944, however, a substantial shift of workers to other industries threatened to reverse the trend.

Turnover in woods crews is nearly twice that of mill crews and, as shown by table 26, small operations have a greater turnover than large operations because men are harder to hold where employment is not steady.

Table 26. - Average labor turnover by 3-month periods.

Item	Percent of crew lost each month			
	3rd qtr. 1943	4th qtr. 1943	1st qtr. 1944	2nd qtr. 1944
Small mills	15	10	9	14
Large mills	9	6	7	7
All mills	14	10	8	14

The greatest loss of workers has been to other industries with the armed forces drawing the second largest group. As might be expected, the older and more highly skilled sawmill workers tended to migrate to industry, while the younger men of the logging crews made the larger contribution to the armed forces.

Absenteeism: Time lost by individual employees varies greatly from one operation to another and from season to season. Averages have ranged from 10 to 20 percent of the planned working time, the higher rates applying in spring and early fall. To measure lost time accurately requires, in addition to time-book figures, explanatory data which are difficult to obtain for any sizable group of mills. However, the two sample breakdowns presented in table 27 are believed to be fairly representative, and insofar as possible every departure from planned time is accounted for.

Table 27. - Analysis of lost time at two Appalachian mills, November 1943.

	Mill #1			Mill #2		
	Woods	Mill	Total	Woods	Mill	Total
Average crew for month	31	31	62	29	20	49
Planned work week	53	50	-	60	60	-
Planned man-hours for month 1/	7,130	6,652	13,782	7,425	4,980	12,405
Operating man-hours lost 2/	145	577	722	198	15	213
Actual possible man-hours	6,985	6,075	13,060	7,227	4,965	12,192
Man-hours worked 3/	5,687	4,746	10,433	6,004	4,689	10,693
Individual employee man-hours lost	1,298	1,329	2,627	1,223	276	1,499
Man-hours lost - absenteeism	1,048	584	1,632	1,070	250	1,320
Man-hours lost - other causes	250	745	995	153	26	179
Percent possible man-hours lost -						
absenteeism	15	10	14	15	5	11
other causes	4	12	8	2	Negl.	1

1/Only actual hours worked by part-time employees included.
2/Causes of lost operating time - snow in woods, breakdown at mill.
3/Including overtime, some of which was worked to make up absent time.

Attempts to explain lost time are seldom successful. In most cases, unless absenteeism is excessive, managers are inclined to dismiss it as negligible. However, some of the causes of lost time are known.

In this region small subsistence farmers form the most important single class of lumber industry labor. That these men must be allowed time off for planting, cultivating, and harvesting their crops is a fact recognized by all lumbermen. Naturally, farming activities have been on a larger scale than usual the past three years. In May 1943, for instance, spring planting accounted for approximately 80 percent of total time lost.

Sickness and injuries are also responsible for a great deal of lost time, and the incidence rate has steadily risen as the industry was forced to employ large numbers of inexperienced and physically unsuited men.

Other causes of absenteeism are of a local or personal nature. Table 28 shows the principal reasons for the lost time shown in the preceding analysis. All absences of three or more days are explained, but the reasons for most absences of shorter duration are unknown.

Table 28. - Causes of absenteeism at two Appalachian mills, November 1943.

Cause	Total absenteeism	
	Mill #1	Mill #2
	Percent	Percent
Injuries and illness	31	24
Farming	2	12
Cold weather (woods crews)	-	10
Loafing (sure cases only)	-	10
Unable to reach new logging job until moved to new homes	9	-
Illness or death in family	-	10
Necessary personal business	3	3
Unknown	55	31

Labor efficiency: A point usually emphasized by operators is the poor quality or lack of experience of the labor now available, and many managers attempt to evaluate the relative efficiency of their employees. An average of these estimates would place the efficiency of present crews at 65 to 70 percent of normal. Adequate data to test such a figure could only be obtained through timing studies, but the comparison in table 29 based on log scale and time-book figures is supporting evidence insofar as woods operations are concerned. The lessened efficiency of mill and yard crews is indicated in table 30. It is further substantiated by the added men often required for certain operations. Thus, three offbearers do the work of two, two tailers replace one at the edger, and two men load inside a boxcar where one formerly sufficed.

Table 29. - Average log output per man-day at three North Carolina operations.

Operation	Production per man-day		Decrease in efficiency
	Year ending Dec. 31, 1941	First six months, 1942	
	Bd.ft. (Doyle)	Bd.ft. (Doyle)	Percent
Cutting	1,351	961	29
Skidding	704	469	33

Table 30. - Trend in production per man-hour at an Appalachian mill.

Item	1941	1942	1943
Sawmill crew			
Production (M bd.ft.)	3,229	3,342	2,888
Direct labor hours	32,249	37,054	31,772
Output per man-hour (bd.ft.)	100	90	91
Decrease from 1941 (Percent)	-	-10	-9
Yard crew			
Volume handled (M bd.ft.)	6,300	5,599	4,344
Direct labor hours	33,426	38,126	29,752
Handled per man-hour (bd.ft.)	188	147	141
Decrease from 1941 (Percent)	-	-22	-25

Equipment

Trucks and tractors: Next to manpower shortage the most serious retardant to production has been the shortage of trucks and tractors, and the difficulties of obtaining parts, tires, and fuel to keep them running. Many lumbermen received their first indication that wartime business was not to be "as usual" when they were unable to obtain truck tires. During the first months of tire rationing, while county allotments were being adjusted to actual needs, logging operations were frequently crippled. The immediate effect on production was not too serious, but worry over future replacements caused some contract truckers and farmers to abandon log hauling in favor of work less damaging to tires.

After the early difficulties were dissolved, tires temporarily ceased to be a problem. However, in October 1943 the situation again became troublesome. Of 82 operators questioned during December, 23 reported recent difficulty in obtaining truck tires. The outlook was again brighter in the early part of 1944, but a critical shortage and possible curtailment of lumber production are indicated for the fall and winter months.

Table 31. - Truck parts reported hard to obtain, August 1943.

Parts	Days to obtain 1/
Differential	120,60,60,60,56,30,22,15
Steering gear	60,60,60,30,22,21,15,8,90
Rear axles	60,60,10,8,60,8
Front axles	5,3,3
Transmission	56,30,3
Brake	60,9,60
Two-speed differential	60,21
Motor	30,30
Rear axle housing	78,150
Flywheel gears	45
Radiators	45,60
Generators	90
Water pumps	30
Oil pumps	14
Connecting rods	30
Tire rims	150
Crankshafts	10
Valves	10
Clutch	3
Springs	2
Transmission bearings	Unobtainable
Dual transmissions	Unobtainable

1/Each figure represents an individual case.

The complexities of gasoline rationing have been a constant source of lost time and wasted effort to small lumbermen. In some states it is difficult to locate a small mill that has been kept in fairly continuous operation without the necessity of at least one trip by its owner to the O.D.T. office. Occasionally, local gas shortages have affected mills of all sizes. Such a shortage at the end of December 1943 shut down a number of North Carolina sawmills including some that were comparatively large. Rationing of gasoline for off-the-highway use has been similarly troublesome.

Truck repairs are not ordinarily mentioned by lumbermen as a critical factor affecting lumber production. Nevertheless, shortages of truck parts or delay in obtaining them were an important cause of lost time during 1943. In August, for instance, data from 124 sawmills revealed that 11 percent of total truck-days were lost waiting for parts.

In general, procurement of minor parts was not a serious problem, but radiators, axles, and parts for differentials, transmissions, and steering gears usually involved delays of 30 to 60 days. In some cases operators were forced to tear down their poorer trucks to keep the rest of the fleet in commission. Table 31 lists parts hard to obtain in August 1943, and the number of days individual operators waited for delivery. By August 1944, expanded production of parts and their easier availability had reduced lost time from this source to 3 percent of total truck-days.

The 124 sawmills surveyed were served by 397 trucks. Of this number 37 or 9 percent lost time during August waiting for parts. Since most of these were trucks needing major repairs, there were presumably many more requiring service. It seems probable that at least one-quarter of the trucks suffered breakdowns of one kind or another.

The heavy incidence of breakdowns was indicative of the condition of the fleet. The life of a logging or lumber truck varies with hauling conditions and the maintenance policy of the operator, but four years is usually considered average for depreciation purposes. It is, therefore, significant that 41 percent of all these trucks and 49 percent of those rated 2 tons or heavier were four years of age or older (table 32). Of the latter, 16 percent were at least eight years old.

Table 32. - Size, age, and number of log and lumber trucks serving 124 sawmills, August 1943.

Size of truck	Year of manufacture								Total
	1942	1941	1940	1939	1938	1937	1936	1935 & earlier	
Tons									
1/2	1	5	2	2	-	-	-	-	10
3/4	-	-	1	1	1	-	-	-	3
1	-	1	1	1	1	1	-	-	5
1-1/2	38	63	49	34	15	10	8	16	233
2	25	25	9	13	1	11	14	8	106
2-1/2	2	1	4	1	1	-	-	4	13
3	2	-	2	-	-	3	5	11	23
4 up	4	-	-	-	-	-	-	-	4
Total	72	95	68	52	19	25	27	39	397

Obviously, many of these vehicles needed immediate replacement. Tables 33 and 34 were based on the owners' estimates of replacement needs. There is no assurance that these schedules represented the needs of other Appalachian mills, but if we assume that they did there was an indicated need for 900 trucks in the last quarter of 1943, 1,000 in the first half of 1944, and 1,400 in the last half of 1944. In addition to the trucks required for replacement of existing equipment, some operators desired extra vehicles. Although considerable wishful thinking undoubtedly entered into the estimates of additional trucks wanted, the indicated demand was for about 200.

Table 33. - Operators' estimates of truck replacements needed, by age of vehicle, at 124 sawmills, August 1943.

Year of truck manufacture	Trucks	Time of replacement				Total
		4th qtr. 1943	First 6 mos. 1944	Second 6 mos. 1944	Beyond 1944	
	Number	Percent	Percent	Percent	Percent	Percent
1942	64	-	3	12	85	100
1941	80	3	8	14	75	100
1940	55	13	21	20	46	100
1939	46	19	23	29	29	100
1938	17	21	32	16	31	100
1937	23	44	8	24	24	100
1936	25	26	15	15	44	100
1935 & earlier	31	26	5	15	54	100

Table 34. - Operators' estimated schedule of truck replacements needed, by size of vehicle, at 124 sawmills, August 1943.

Size of truck	Trucks in service	Time of replacement			
		4th qtr. 1943	First 6 mos. 1944	Second 6 mos. 1944	Beyond 1944
Tons	Number	Number	Number	Number	Number
1 or under	18	1	1	2	14
1-1/2	233	35	38	49	111
2	106	16	9	14	67
2-1/2	13	1	2	1	9
3	23	1	-	4	18
4 up	4	-	-	-	4
All sizes	397	54	50	70	223
Percent	100	14	13	18	55

A resurvey in August 1944 of 62 of the original mills revealed the developments of the intervening 12 months. At the end of August 1943 these mills had 229 trucks in service. Twenty-one of the operators expected to keep all their equipment another year or longer, while 41 estimated their replacement needs through the third quarter of 1944 at 90 vehicles. A few needed extra trucks.

During the ensuing year 31 new or used trucks were purchased. Since only 13 were junked and 5 sold, the net result was the addition of 13 trucks to existing fleets. Twenty of the 31 trucks acquired, however, were extras; only 11 actually replaced old equipment. Of the 90 trucks needing replacement 79 were not replaced. Eight of the latter have already been junked or sold as unfit for heavy use.

Table 35. - Change in number of log and lumber trucks serving 62 sawmills during the 12-month period from August 31, 1943, to August 31, 1944.

Annual production class	Sample mills	Trucks owned on August 31, 1943	Trucks purchased	Trucks junked or sold	Trucks owned on August 31, 1944
M bd.ft.	Number	Number	Number	Number	Number
50 - 999	33	46	5	4	47
1,000 - 4,999	23	138	20	12	146
5,000+	6	45	6	2	49
Total	62	229	31	18	242

On September 30, 1944, 41 percent of the 242 trucks now in service will be due or past-due for replacement. By that time the supply of used trucks suitable for sawmill use will be virtually exhausted, and 15 percent of the past year's acquisitions have been used trucks. The implication is that losses through junking or other disposal of worn-out vehicles will soon exceed current replacements unless allocations of new vehicles are stepped up considerably.

Table 36. - Operators' estimated schedule of truck replacements needed, by size of vehicle, at 62 sawmills, September 1944.

Size of truck	Trucks in service	Time of replacement			
		4th qtr. 1944	First 6 mos. 1945	Second 6 mos. 1945	Beyond 1945
Tons	Number	Number	Number	Number	Number
1 or under	14	5	1	5	3
1-1/2	130	60	21	16	33
2	67	27	7	16	17
2-1/2 up	31	8	5	11	7
All sizes	242	100	34	48	60
Percent	100	41	14	20	25

The crawler tractor situation has paralleled that of trucks. Allocations of new tractors have slightly exceeded losses to date, but here again 40 percent of present equipment is due or past-due for replacement. An additional 20 percent would normally be replaced during 1945. Parts delays up to six months have been reported, lost time averaging about 12 percent of total tractor-days. An added difficulty has been the scarcity of men skilled in tractor maintenance and repair. Machines must often be transported long distances for comparatively minor adjustments which were formerly made on the job.

Power units: The use of factory-built power units is a comparatively recent development in the Appalachian lumber industry. However, during the past five or six years these units have replaced steam, farm tractors, and other types of power to such an extent that they now power over 40 percent of the mills. It is estimated on the basis of a 285-mill sample that about 2,100 power units are in use. About 10 percent of these are Diesels; the others operate on gasoline, kerosene, or distillate.

Nearly one-half of the power units are within the 60-79 horsepower range (table 37). A 66 horsepower model is especially popular. At the larger hardwood operations units of 80 or more horsepower are commonly employed, the owners believing that the gain in efficiency resulting from the use of ample power more than offsets the added investment. A North Carolina operator, for example, averages 8 thousand board feet per day with an 88 horsepower Diesel unit. To save labor he has installed a sawdust blower in addition to the saw, log puller, edger, and trimmer. Fuel costs amount to 46 cents per thousand board feet.

Table 37. - Number and horsepower of power units at sawmills June 1, 44.

Annual production class	Total power units	Horsepower class					
		20-39	40-59	60-79	80-99	100+	Total
M bd.ft.	Number	Percent	Percent	Percent	Percent	Percent	Percent
50 - 499	1,524	10	42	45	-	3	100
500 - 999	365	10	26	48	10	6	100
1,000 - 4,999	235	-	20	40	25	15	100
All mills	2,124	9	37	45	4	5	100

Nearly 45 percent of the power units in use are less than two years old, indicating that many have been released to the industry since the start of the war. But in recent months new equipment has become increasingly difficult to procure. Indicative of the built-up demand for replacements is the fact that one-third of the units in operation are at least five years old.

Table 38. - Age of power units at sawmills, June 1944.

Annual production class	Proportion of mills					
	1 year	2 years	3 years	4 years	5 yrs.+	Total
M bd. ft.	Percent	Percent	Percent	Percent	Percent	Percent
50 - 499	19	26	7	9	39	100
500 - 999	18	18	18	28	18	100
1,000 - 4,999	18	23	18	15	26	100
All mills	19	24	10	13	34	100

The trend in demand is for larger power units. Present units at mills cutting less than a million board feet a year average about 56 horsepower. The replacements desired average 66 horsepower. The average unit at mills producing a million board feet or more is of 60-66 horsepower; desired replacements will average 90 horsepower or more. Steam mill operators who wish to convert plan to buy 70-80 horsepower units. About 15 percent of the prospective purchasers expressed a preference for Diesel power.

The need for new power units has had small effect on lumber production to date. However, 9 percent of the operators using them will require replacements later in 1944 or early in 1945. In addition, 11 percent of those using steam and 5 percent of those using farm tractors must replace

their present equipment in the near future. Apparently, the region will need about 400 new power units within the next 12 months.

Other equipment and supplies: The procurement of other equipment and supplies has also suffered delays but most essential items have been obtainable. During 1942 lumbermen were handicapped by a low preference rating, and were sometimes unable to purchase machine parts and other critical items such as wire rope. This situation was corrected in the spring of 1943 when the lumber industry was granted an AA-1 priority. From time to time since then local shortages of various items have appeared but were usually short-lived. Typical was a scarcity of leather-palmed workmen's gloves in West Virginia. Previously, shortages of hand tools caused trouble in many localities and before that a lack of truck chains. Shipments of anti-freeze preparations were late in reaching many dealers in the fall of 1943, and then were of insufficient size. Individually, none of these shortages has been critical, but in the aggregate they have diverted administrative effort from the supervision of mill and woods work.

Other Factors

Cost of production vs. selling price: Since May 1942 mill sales of Appalachian lumber have been subject to the provisions of various maximum price regulations, notably MPR 146. This regulation has been cited by hardwood lumbermen as an obstacle to production. Original objections were on the grounds that it prevented wage competition with other industries, since at the larger mills a 10-cent per hour wage increase adds $4.25 to $4.50 per thousand board feet to the cost of lumber. To whatever extent lumber ceilings contributed to the industry's labor shortage they can be blamed for reducing production. However, when wages were "frozen" this argument became invalid.

On the other hand, between May 1942 and May 1943 average hardwood production costs increased more than 25 percent. In some cases this increase was offset by the greater value of the special items and grades sold, but a number of mills whose production had been reduced by shortages of manpower reported current operation at a loss. Then, as of November 1943 the Office of Price Administration revised the ceiling prices upward. Of 73 lumbermen questioned in December, only 11 expressed dissatisfaction with the amended prices, and eight objected only to the prices of particular grades or species. The effect upon production of the marginal profits or losses of the intervening period is not known. During the second quarter of 1944 there was again agitation for price revision, but many operators appeared unconvinced of the need for a general price advance.

The case against MPR 19A, controlling the price of rough, green, yellow pine lumber from small mills, appears clearer-cut judging by a survey of a 57-mill sample in June 1944. The prices established by MPR 19A in March 1944 constituted a "roll-back" for 77 percent of the producers questioned. Table 39 compares the average gross sales realization before issuance of the regulation with that which the same production would bring at 19A prices. Since each state is given a weight in the averages equal to its total pine production, the Virginia price advantage of $2 permitted

under Amendment 1 to the regulation is automatically taken into account. This differential yields the average Virginia mill a realization from all products of $32.27 against $31.19 elsewhere in the region. The fact that the actual advantage is only $1.08 instead of $2.00 is due to the larger proportion of high value special products, such as crossarms and car decking, produced farther south.

Table 39. - Comparison of 19A sales realization with sales realization prior to 19A.

Product	Average gross sales realization per thousand board feet	
	Before 19A	Under 19A
	Dollars	Dollars
Boards	32.28	32.14
Dimension	32.95	29.22
Small timbers	37.01	28.22
Car decking	36.00	36.00*
Crossarms	43.84	43.84*
All products	33.05	31.28

*These figures based on assumption that prevailing prices of $36 for decking and $43 for 8 ft. crossarms or $45 for 16 ft. crossarms are acceptable to O.P.A.

The average realization from boards under the regulation remains substantially the same as before, but the disparity between the old prices and ceiling prices of dimension and small timbers is sufficient to warrant comment. It can be partially explained by the fact that 35 percent of the mills formerly sold most of their output at a flat price regardless of product. A further explanation in the case of dimension is that mills selling to concentration yards and other commercial lumber buyers have found board production more profitable. As a result, a high proportion of the dimension has been produced by mills selling to retailers or to local customers at $35 or more per thousand board feet. Small timbers formerly yielded a comparatively high average realization because much of the output was sawed to order, often to the specifications of local school boards, state highway commissions, or railroad companies. Such material is actually not a log run product, but a recurring special.

The present average realization from yellow pine products is slightly more than before March 16 and nearly $2 above that possible under 19A prices (see table 19). In spite of the widespread violations of the ceilings, however, most operators claim to be about breaking even.1/ This dissatisfaction with pine prices has resulted in some shutdowns, a few switches from independent to contract operation, and a substantial shift of production to hardwoods and white pine. In many instances the production shift last mentioned has meant a loss to the war effort, since oak and yellowpoplar, the principal alternate species, were sold on grade, buyer's inspection to non-essential consumers.

1/The present cost of producing log run yellow pine lumber is discussed on page 20.

Table 40. - Developments at 42 mills resulting from MPR 19A.

Applied to sell "on grade"	2 mills[1/]
Shift of production to hardwoods and white pine	6 mills
Shift to contract operation	1 mill
Out of business	2 mills[2/]
Planning to go out of business	2 mills
Change of customers	1 mill
No change	28 mills

1/One mill was granted authorization by O.P.A.
2/One operator now cutting pulpwood.

Wages: During the fourth quarter of 1943 the pressure for wage increases in forest products industries became intense, especially in Kentucky and West Virginia. Increased earnings of coal miners, the railway wage negotiations, and knowledge of the raise in hardwood lumber prices all contributed to employee dissatisfaction. Pulpwood and mine prop operators as well as many small lumbermen met this by raising wages from 35 or 40 cents per hour to 45 or 50 cents. Some paid 60 cents or more. All of this left the larger lumber companies in a disadvantageous position. Most of them were located in or near coal fields; many operated mines and were thus their own competition for labor. Base wages at these mills already ranged from 45 to 65 cents per hour, the majority paying the ceiling wage of 50 cents. For awhile they lost men faster than replacements could be found. As a result, a considerable number of companies made applications for wage increases. Action on the earlier applications required an average of three months and several were denied. By the second quarter of 1944 most of the applications had been approved, but in many cases the workers lost could not be replaced.

A P P E N D I X

Table A-1. - Lumber production by states and species, Appalachian hardwood region, 1942.

Species	Georgia, South Carolina	Tennessee	North Carolina	Virginia	Kentucky	West Virginia	Maryland	Total
	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.
SOFTWOODS								
Cedar	15	2,629	11	80	1,007	11	1	3,754
Hemlock	1,316	8,673	9,027	10,858	9,918	31,156	758	71,706
White pine	1,938	14,948	37,843	16,903	2,199	4,477	294	78,602
Yel. pine	88,645	150,009	95,896	34,078	44,324	9,364	474	422,790
Spruce-fir	-	-	75	46	-	17,143	-	17,264
Total	91,914	176,259	142,852	61,965	57,448	62,151	1,527	594,116
HARDWOODS								
Ash	44	1,476	1,091	1,225	2,450	6,226	126	12,638
Basswood	118	2,571	3,294	3,266	9,426	29,165	333	48,173
Beech	89	5,017	905	4,291	24,724	43,311	382	78,719
Birch	12	679	1,940	562	619	9,887	453	14,152
Chestnut	131	4,202	26,542	7,988	2,690	19,959	252	61,764
Hickory	272	3,478	971	4,630	7,257	27,885	1,538	46,031
Maple	179	5,498	5,992	4,078	11,538	60,999	2,687	90,971
Oak	21,528	84,541	78,429	136,216	123,906	244,721	11,651	700,992
Black gum	37	627	551	432	1,661	7,516	31	10,855
Walnut	8	830	212	1,496	2,268	5,647	108	10,569
Yel.poplar	6,333	17,568	23,217	35,046	32,398	62,483	1,248	178,293
Other	386	2,198	2,792	5,008	3,540	8,506	821	23,251
Total	29,137	128,685	145,936	204,238	222,477	526,305	19,630	1,276,408
All species	121,051	304,944	288,788	266,203	279,925	588,456	21,157	1,870,524

Table A-2. - Number of active sawmills and lumber production by counties, Appalachian hardwood region, 1942.

County	Mills	Lumber production
	No.	M bd.ft.
GEORGIA		
Fannin	29	4,613
Habersham	43	19,579
Lumpkin	27	12,755
Rabun	18	2,446
Towns	6	328
Union	22	6,006
White	32	21,912
Total	177	67,639
SOUTH CAROLINA		
Greenville	55	15,161
Oconee	58	19,594
Pickens	25	18,657
Total	138	53,412
TENNESSEE		
Anderson	29	3,274
Blount	36	8,954
Bradley	37	13,847
Campbell	20	10,555
Carter	24	5,544
Claiborne	35	2,843
Cocke	23	5,788
Fentress	31	25,349
Grainger	28	4,798
Greene	51	5,921
Hamblen	10	724
Hamilton	52	19,165
Hancock	19	4,628
Hawkins & Sullivan*	60	12,374
Jefferson	20	9,694
Johnson	32	5,696
Knox	33	18,335
Loudon	15	2,927
McMinn	33	9,986
Meigs	16	5,094
Monroe	34	8,270
Morgan	51	31,606
Pickett	6	3,287
Polk	22	12,939
Rhea	20	17,084
Roane	29	7,898
Scott	45	30,793
Sevier	27	10,514
Unicoi	16	2,790
Union	10	722
Washington	28	3,545
Total	892	304,944
NORTH CAROLINA		
Alexander	49	11,529
Alleghany	17	3,871
Ashe	48	8,075
Avery	25	6,512
Buncombe	50	9,683
Burke	44	12,687
Caldwell	69	17,978
Cherokee & Graham*	33	17,301
Clay	7	7,990
Cleveland	34	7,520
Haywood	17	12,310
Henderson	13	2,287
Jackson & Transylvania*	23	24,692
McDowell	36	6,976
Macon	20	11,376
Madison	24	4,264
Mitchell	23	4,335
Polk	21	7,798
Rutherford	50	18,233
Surry	97	17,687
Swain	10	13,475
Watauga	65	10,724
Wilkes	150	40,942
Yancey	24	10,543
Total	949	288,788
VIRGINIA		
Albemarle	31	14,417
Alleghany	13	847
Amherst	18	2,271
Augusta	45	7,413
Bath	30	7,416
Bedford	69	12,092
Bland	28	22,055
Botetourt	24	1,828
Buchanan	42	9,331
Carroll	74	11,739

Table A-2 (Cont.)

County	Mills	Lumber production
	No.	M bd.ft.
VIRGINIA (Cont.)		
Clarke	5	1,160
Craig	16	2,129
Dickenson & Wise*	32	24,691
Fauquier	15	3,467
Floyd	63	9,967
Franklin	83	13,604
Frederick	41	9,290
Giles	18	2,438
Grayson	42	7,334
Green	6	1,405
Highland	35	13,388
Lee	23	2,380
Loudoun	16	2,877
Madison	19	3,273
Montgomery	23	1,328
Nelson	23	3,957
Page	25	1,202
Patrick	86	15,379
Pulaski	13	3,571
Rappahannock	11	2,406
Roanoke	17	1,887
Rockbridge	25	3,818
Rockingham	50	5,889
Russell	7	592
Scott	23	1,775
Shenandoah	51	6,041
Smyth	19	2,929
Tazewell	15	17,625
Warren	8	961
Washington	33	8,907
Wythe	10	1,124
Total	1227	266,203
KENTUCKY		
Bell	33	9,665
Boyd	10	4,295
Breathitt	19	2,528
Carter	18	1,947
Clay	25	4,315
Clinton	18	3,877
Elliott	20	1,954
Estill	25	2,715
Floyd	25	4,660
Harlan	38	38,571
Jackson	17	2,947
Johnson	14	1,574
Knott	29	4,850
Knox	25	17,299
Laurel	40	13,775
Lawrence	29	5,721
Lee	8	751
Leslie	24	10,020
Letcher	28	14,095
McCreary	33	28,659
Magoffin	22	4,572
Martin	7	893
Menifee	15	4,070
Morgan	26	2,753
Owsley	14	6,839
Perry	39	17,830
Pike	78	24,731
Powell	20	3,898
Pulaski	52	11,540
Rockcastle	26	1,962
Rowan	21	3,455
Wayne	25	12,044
Whitley	41	9,085
Wolfe	11	2,035
Total	875	279,925
WEST VIRGINIA		
Barbour	48	7,839
Berkeley	25	2,690
Boone	21	15,531
Braxton	29	4,326
Brooke & Hancock*	5	264
Cabell	13	1,106
Calhoun	15	1,120
Clay	26	16,870
Doddridge	27	2,953
Fayette	31	25,020
Gilmer	16	4,205
Grant	22	6,037
Greenbrier	42	40,299
Hampshire	60	5,986
Hardy	35	4,970
Harrison	21	6,392
Jackson	19	1,216
Jefferson	6	505
Kanawha	41	16,392

Table A-2 (Cont.)

County	Mills	Lumber production
	No.	M bd.ft.
WEST VIRGINIA (Cont.)		
Lewis	27	6,999
Lincoln	42	4,806
Logan	23	21,890
McDowell	41	37,876
Marion	34	2,859
Marshall	29	2,274
Mason	11	757
Mercer	47	14,741
Mineral	18	3,466
Mingo	44	11,980
Monongalia	24	6,351
Monroe	37	6,996
Morgan	23	2,446
Nicholas	23	62,436
Ohio	5	191
Pendleton	37	12,313
Pleasants	5	508
Pocahontas	19	23,437
Preston	104	33,490
Putnam	18	1,094
Raleigh	36	15,423
Randolph	45	29,897
Ritchie	31	5,733
Roane	24	1,418
Summers	39	13,453
Taylor	28	5,023
Tucker	28	2,055
Tyler	16	2,226
Upshur	34	7,676
Wayne	42	12,003
Webster	12	32,818
Wetzel	35	4,527
Wirt	16	1,955
Wood	31	2,140
Wyoming	28	31,478
Total	1558	588,456
MARYLAND		
Allegany	18	4,418
Frederick	35	1,946
Garrett	39	13,458
Washington	18	1,335
Total	110	21,157

*Counties combined to avoid disclosing information for individual establishments.

Table A-3. - Hardwood grade yields at four Appalachian bandmills, 1943.
(Green-chain inspection)

SECOND-GROWTH TIMBER - NORTHERN APPALACHIAN REGION

Species	FAS	#1 Com. & Sel.	WHND	#2 Com.	SW	#3 Com.	S.E.S.	Ties	Misc.	Basis
	Percent									M bd.ft.
Ash	26.9	32.7		17.6		22.8				56
Basswood	17.1	45.0		27.1		10.8				128
Beech	19.0	45.0		26.0		10.0				103
Birch	12.1	28.2		40.4		19.3				46
Cherry	10.0	30.0		50.0		10.0				207
Chestnut				50.0		50.0				24
Hard maple	11.8	30.1		14.8		43.3				1,108
Soft maple	17.0	44.9		20.7		17.4				225
Red oak	20.4	49.8		12.7		11.9		5.2		725
White oak	6.1	18.3		7.9	1.3	13.9	50.4	2.1		786
Walnut									Mill run 100	2
Yel.poplar	1.8	38.8		46.2		13.2				787
All species	11.0	34.5		22.4	0.2	21.1	9.5	1.3		4,197

OLD-GROWTH TIMBER - NORTHERN APPALACHIAN REGION

Species	FAS	#1 Com. & Sel.	WHND	#2 Com.	SW	#3 Com.	S.E.S.	Ties	Misc.	Basis
	Percent									M bd.ft.
Ash	36.5	34.4		28.3		0.8				137
Basswood	14.7	24.4		26.7		34.2				1,035
Beech	1.9	10.4		22.1	2.7	55.7	1.9		Flitch 5.3	2,376
Birch	9.6	22.4		30.1		37.9				1,378
Cherry	3.6	11.0		35.2		50.2				372
Chestnut				15.8	0.4	56.0	27.8			1,325
Hickory	1.2	9.8		22.9		66.1				103
Hard maple	6.3	15.5		12.8		65.4				5,763
Soft maple	18.5	41.0		40.3		0.2				959
Red oak	14.2	19.3		17.5	0.3	48.7				962
White oak	1.6	5.0		7.6	14.9	51.1	15.8		Sound 4.0	327
Yel.poplar	2.8	17.4		14.8		61.5			Saps 3.5	1,458
All species	6.9	16.3		19.5	0.7	52.5	2.9		1.2	16,195

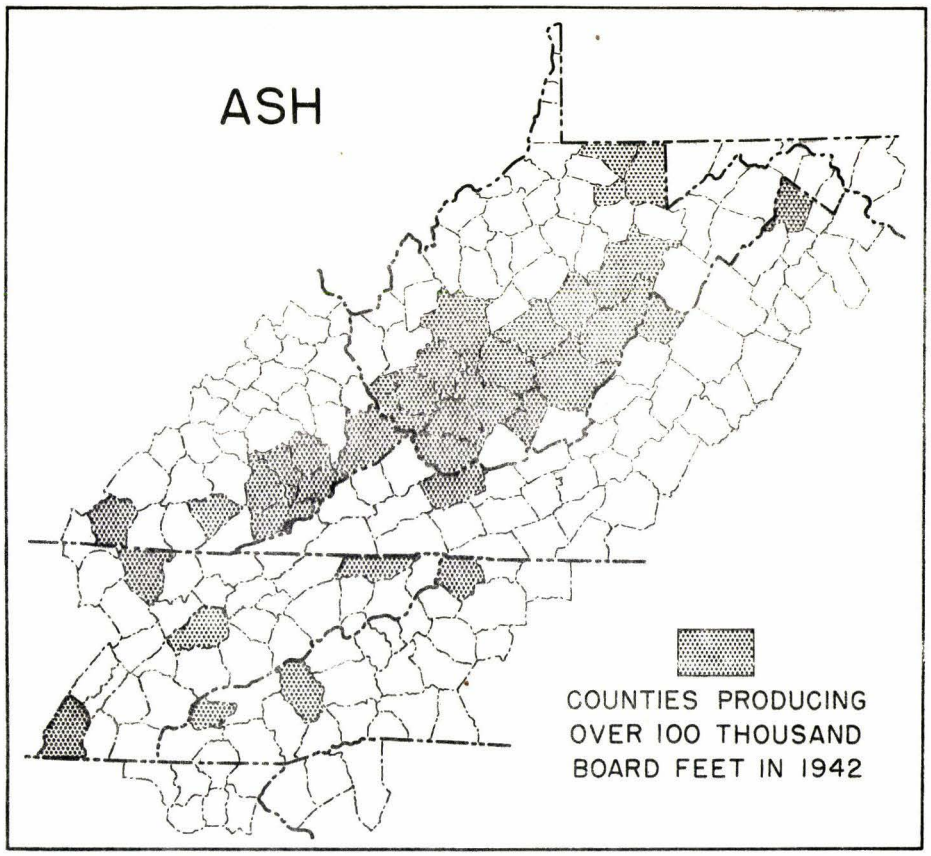
Table A-3. (Cont.)

OLD-GROWTH TIMBER - CENTRAL APPALACHIAN REGION

Species	FAS	#1 Com. & Sel.	WHND	#2 Com.	SW	#3 Com.	S.E.S.	Ties	Misc.	Basis
	Percent									M bd.ft.
Ash	12.4	34.0		34.8		18.8				15
Basswood	25.5	29.7		38.6		6.2				135
Beech	4.3	21.2		29.4		22.5	8.0	14.6		194
Birch	5.5	21.9		24.3		24.3	8.5	15.5		14
Butternut	2.4	39.6		41.6		16.4				2
Cherry	27.0	47.4		20.0		5.6				1
Chestnut						100.0				<1
Black gum						29.9	7.3	13.2	Log run 49.6	49
Hickory	17.2	24.8		25.1		29.5	1.2	2.2		49
Hard maple	12.7	22.6		20.3		21.8	8.0	14.6		419
Soft maple	10.9	21.5		23.3		21.0	8.2	15.1		65
Red oak	22.8	38.7		38.0		0.5				303
White oak	3.0	9.7	12.8	2.3	12.7	30.3	12.8	16.4		2,306
Walnut	14.2	31.2		39.0		15.6				21
Yel.poplar	19.3	29.9		23.7		21.9			Saps 3.8 Bung 1.4	1,006
All species	9.8	18.8	6.5	14.1	6.4	24.4	7.7	10.6	1.7	4,579

OLD-GROWTH TIMBER - SOUTHERN APPALACHIAN REGION

Species	FAS	#1 Com. & Sel.	WHND	#2 Com.	SW	#3 Com.	S.E.S.	Ties	Misc.	Basis
	Percent									M bd.ft.
Ash	31.6	39.4		20.8		8.2				57
Basswood	16.1	33.1		43.6		7.2				403
Beech	8.9	22.1		34.5		34.5				17
Birch	8.8	32.8		38.7		19.7				65
Buckeye	7.4	35.4		42.6		14.6				51
Butternut	2.0	24.3		62.7	2.8	8.2				6
Cherry	11.0	33.8		44.3		10.9				20
Chestnut			18.3		65.1	16.6				532
Chittum	3.3	29.7		53.2		13.8				15
Hickory	0.4	12.9		73.9		12.8				56
Hard maple	13.4	38.1		30.5		18.0				96
Soft maple	9.0	35.3		44.4		11.3				57
Red oak	21.7	38.3		19.2	5.8	15.0				787
White oak	3.9	15.9	2.9	9.3	36.9	27.7	3.4			360
Walnut		28.9		7.2		63.9				<1
Yel.poplar	5.5	27.0		41.5		7.4			Saps 15.3 Bung 3.3	458
All species	10.9	25.4	3.6	24.6	17.6	14.6	0.4		2.9	2,980



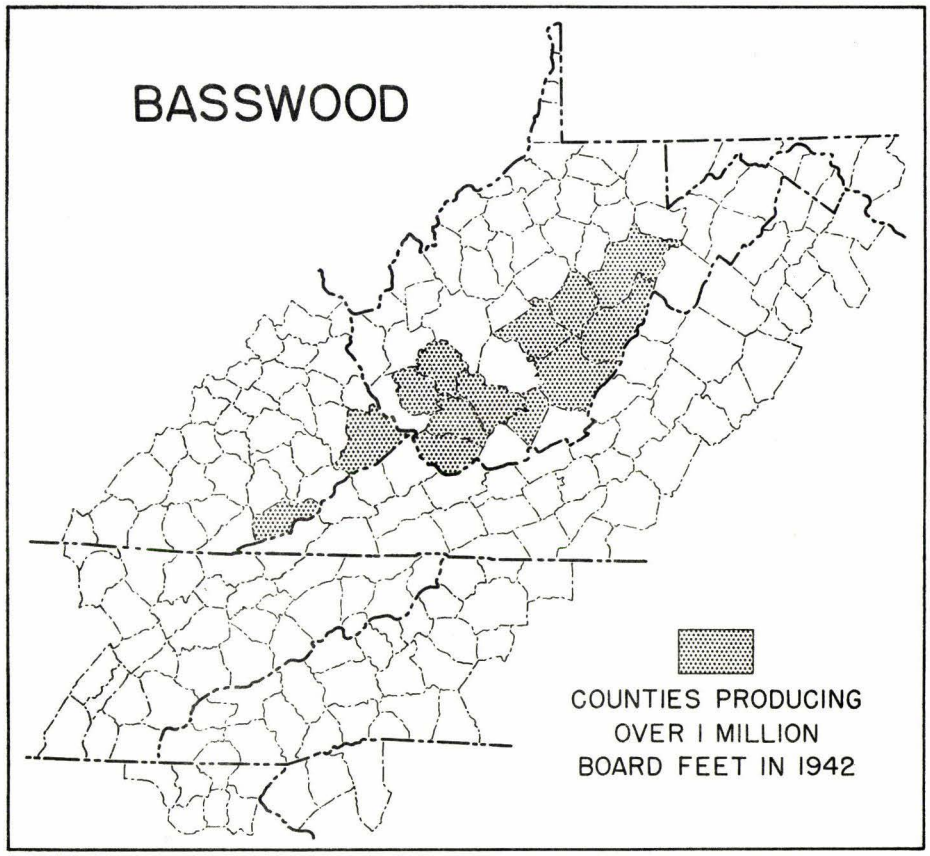
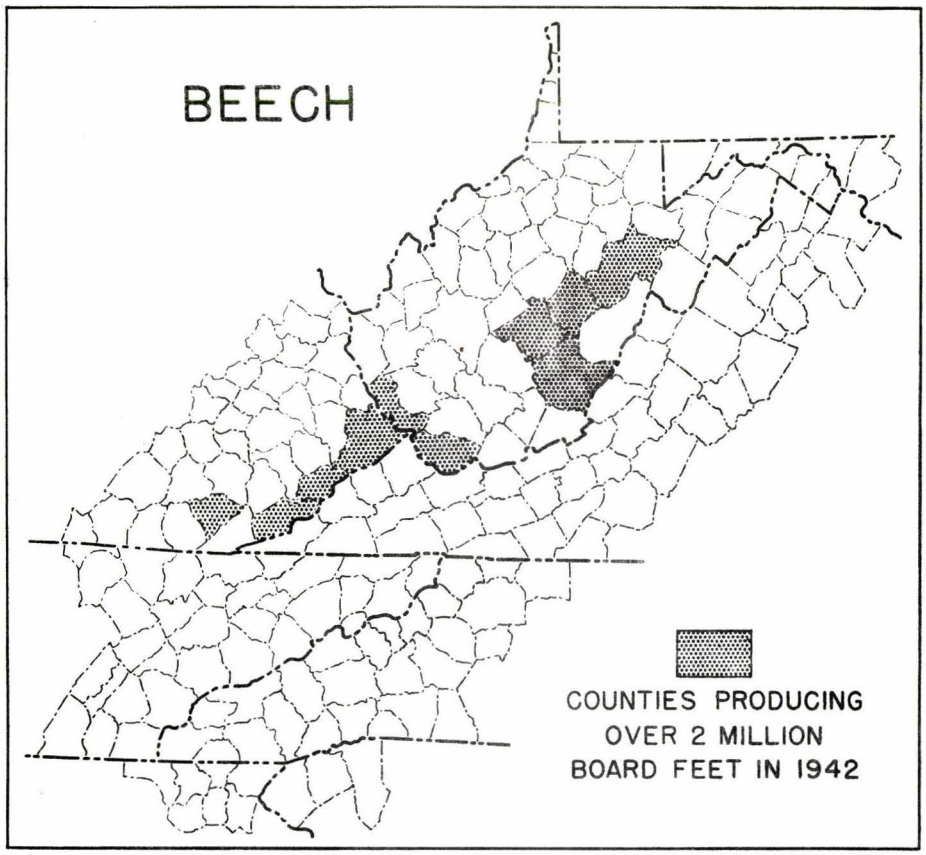


Figure 15. - Counties leading in the production of ash and basswood lumber, 1942.



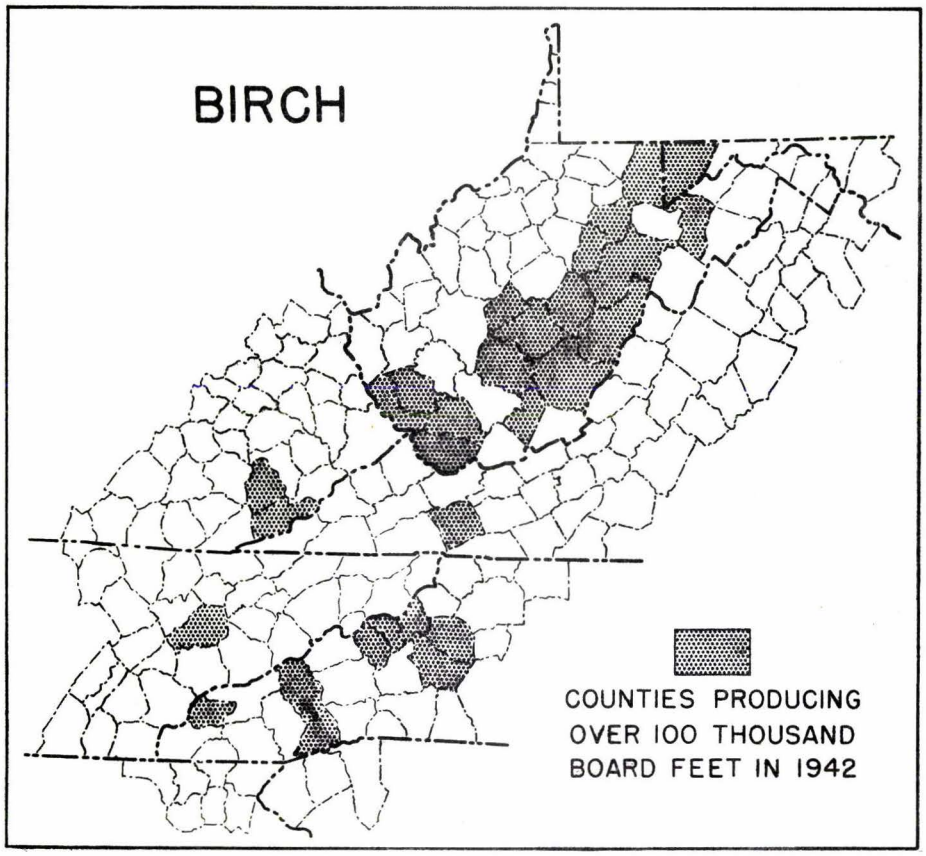
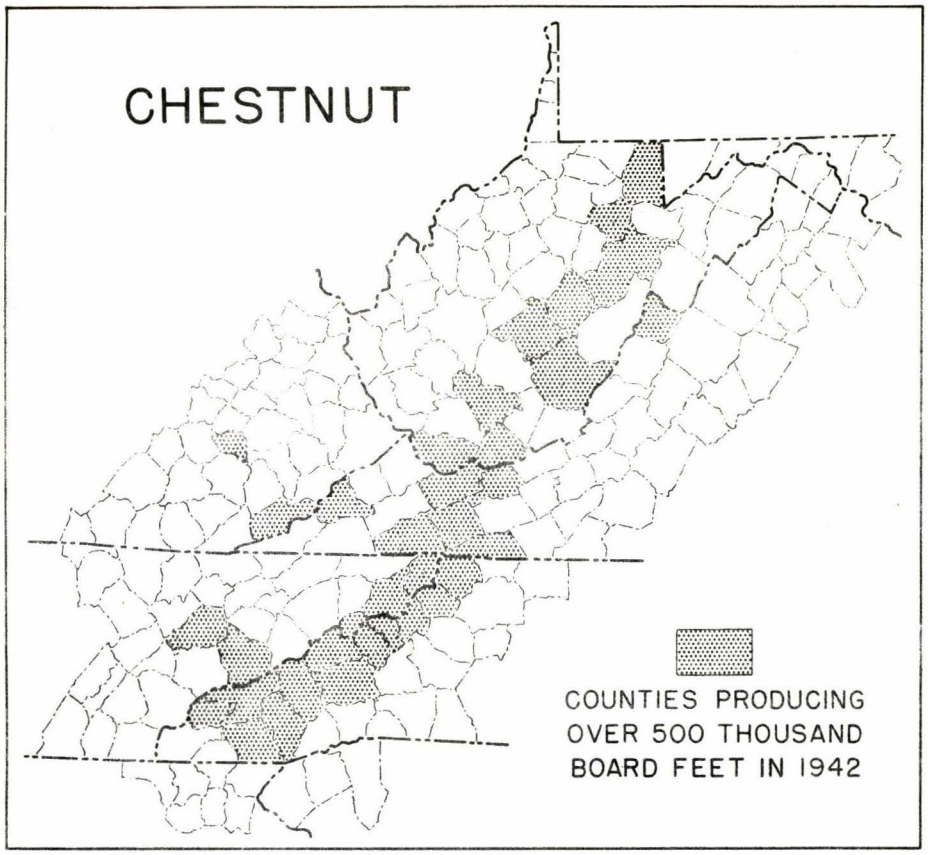


Figure 16. - Counties leading in the production of beech and birch lumber, 1942.



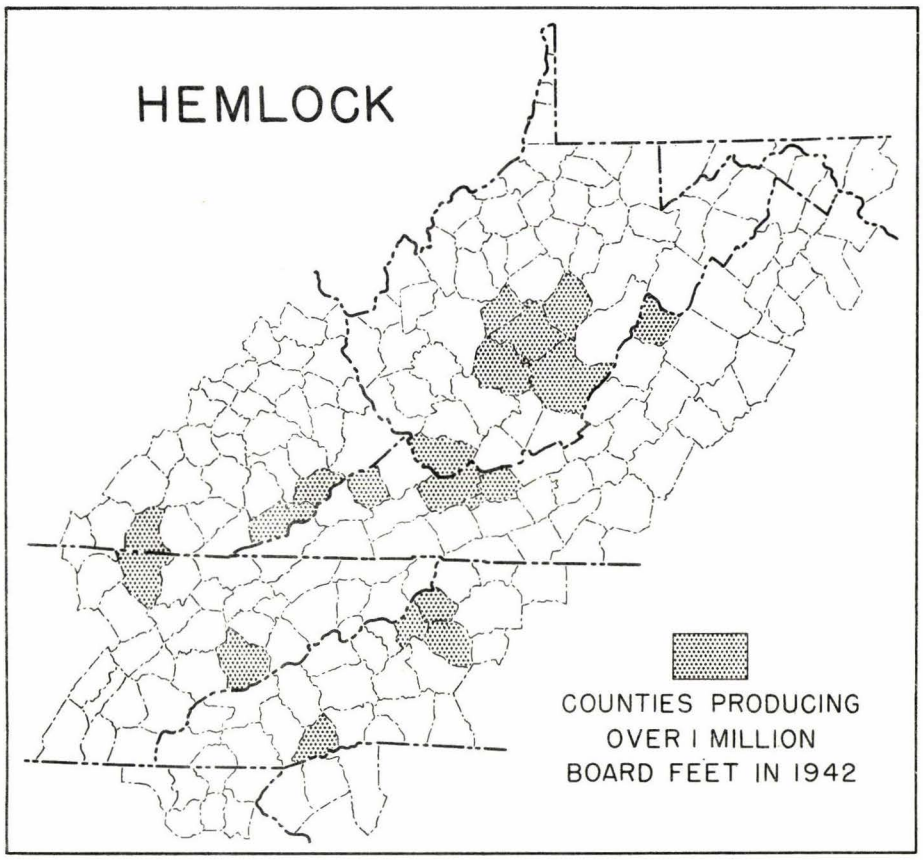
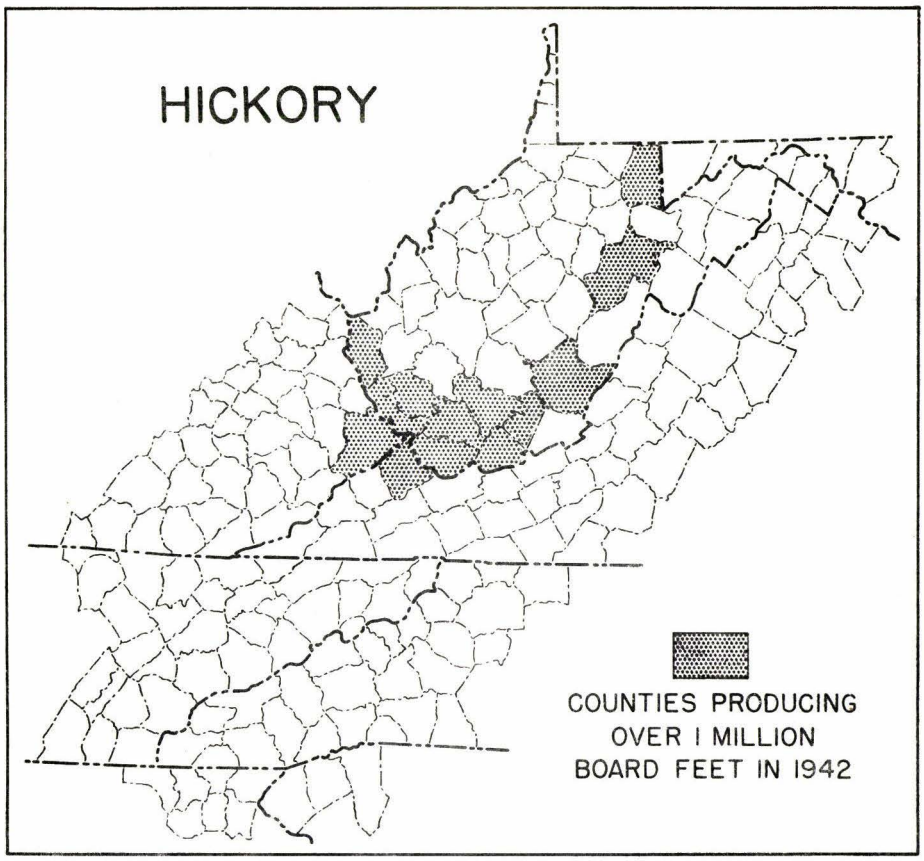


Figure 17. - Counties leading in the production of chestnut and hemlock lumber, 1942.



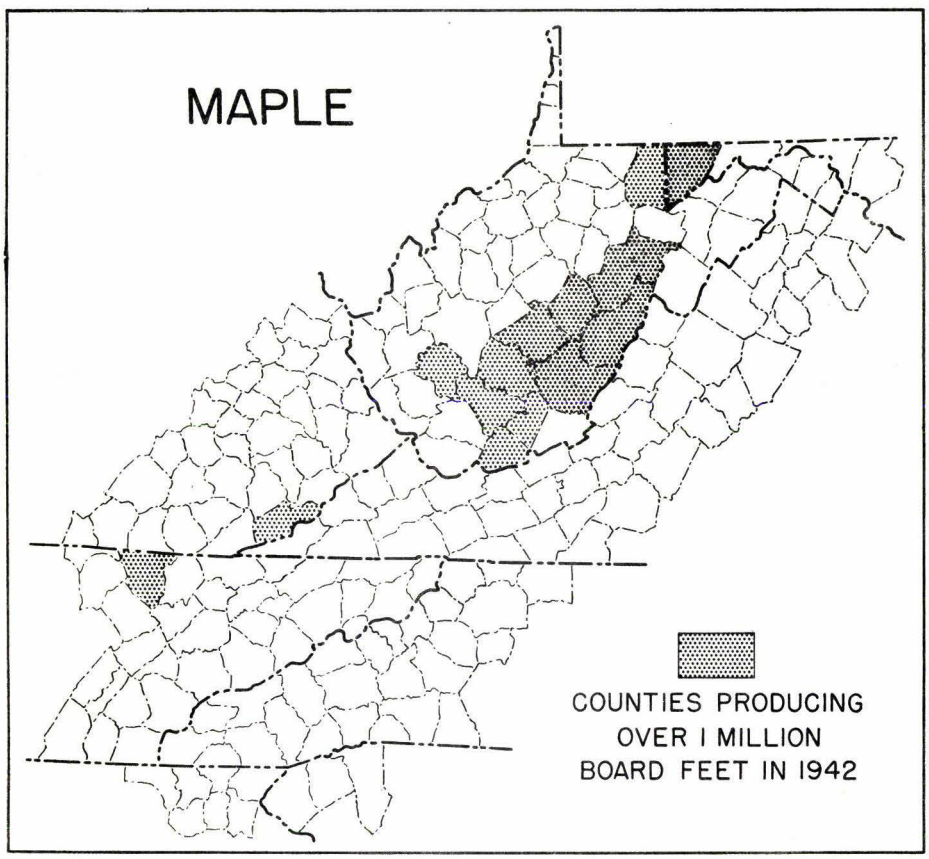
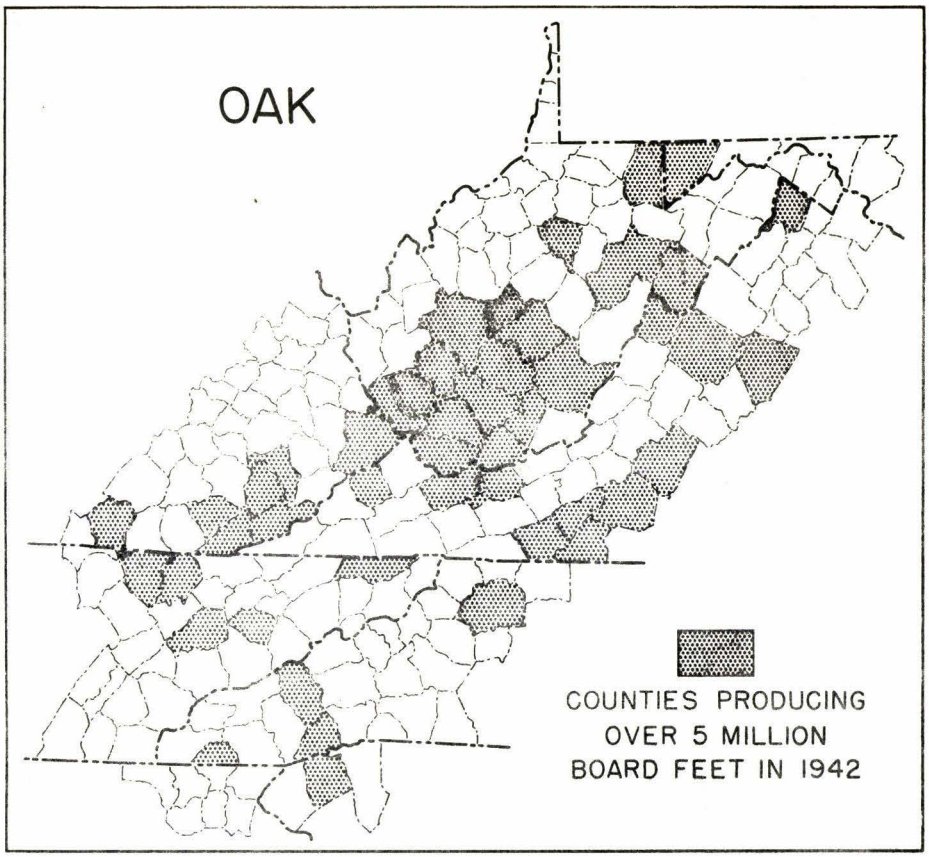


Figure 18. - Counties leading in the production of hickory and maple lumber, 1942.



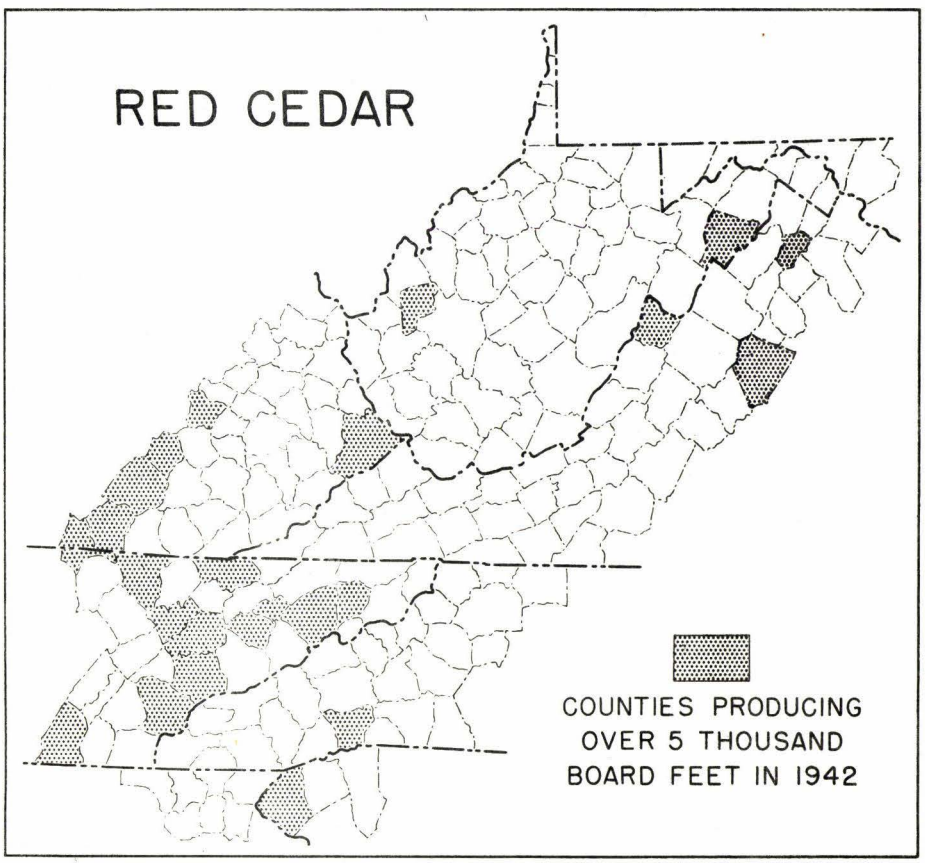
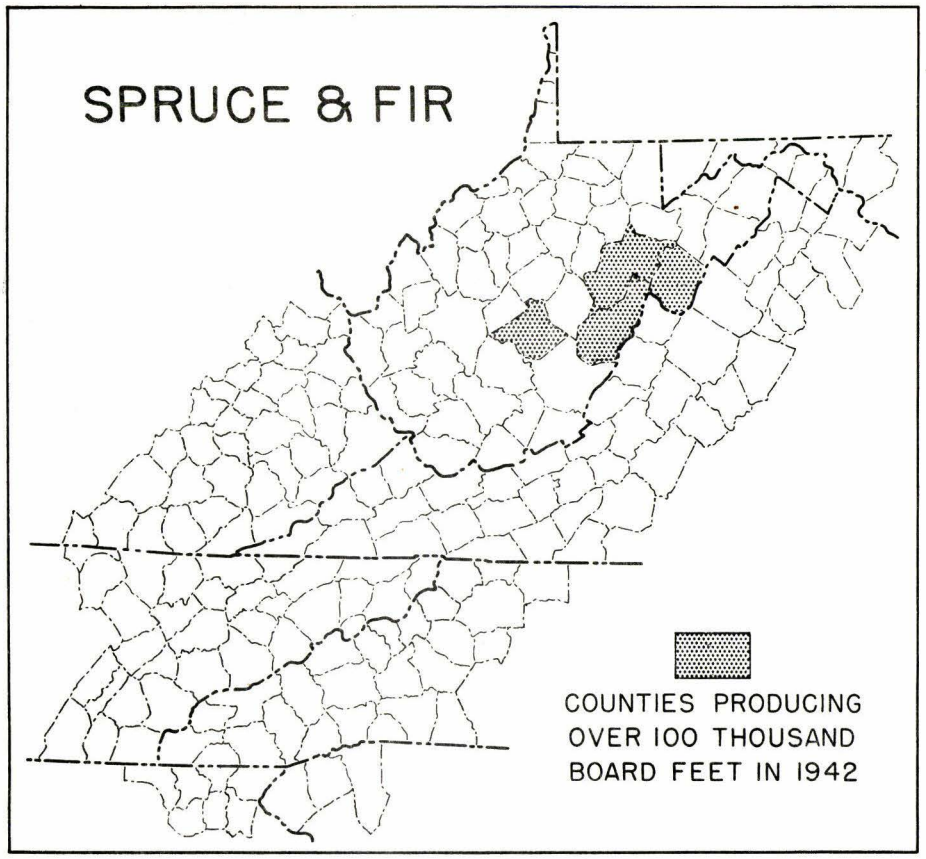


Figure 19. — Counties leading in the production of oak and redcedar lumber, 1942.



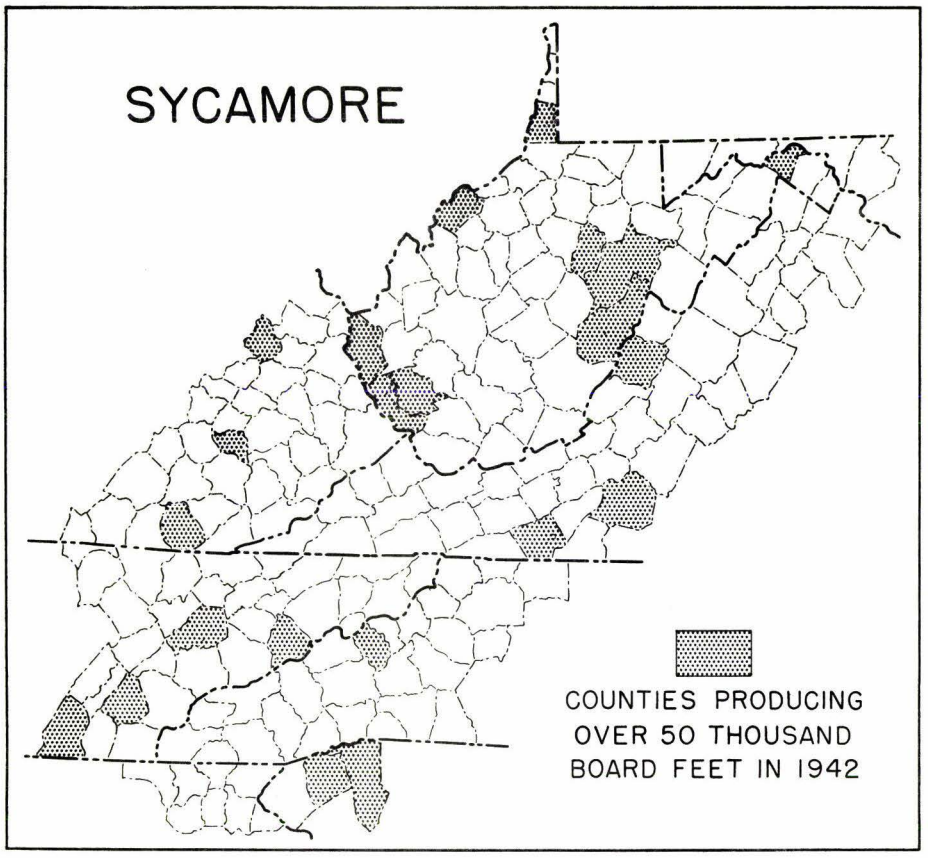
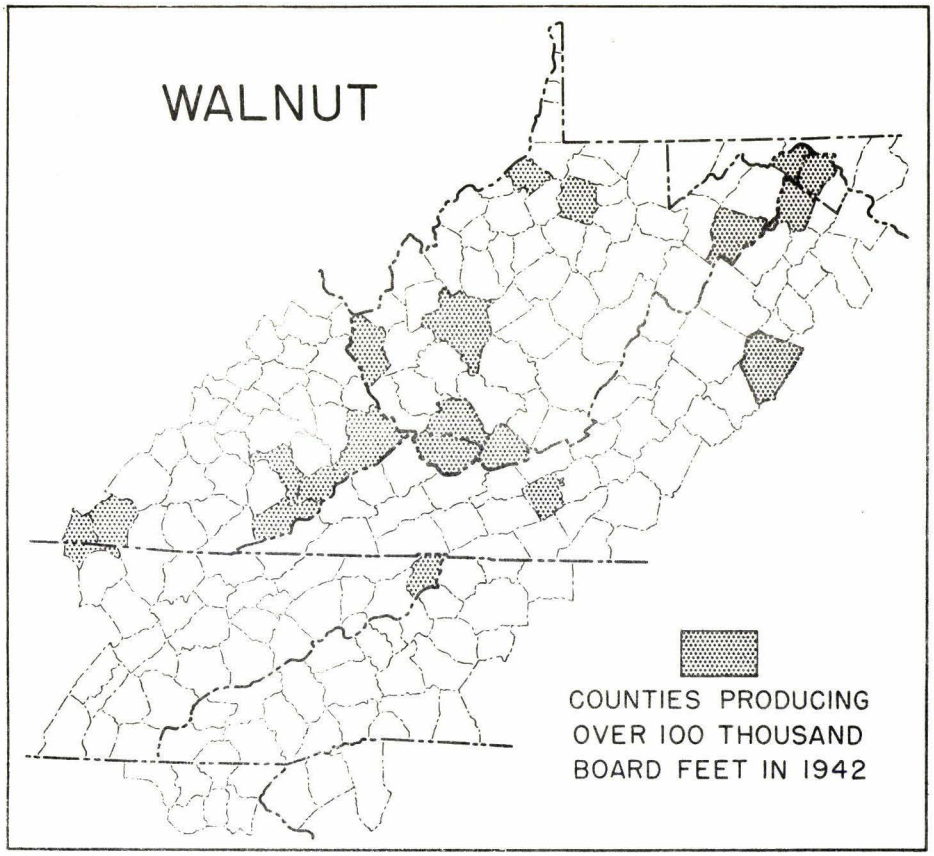


Figure 20. - Counties leading in the production of spruce and sycamore lumber, 1942.



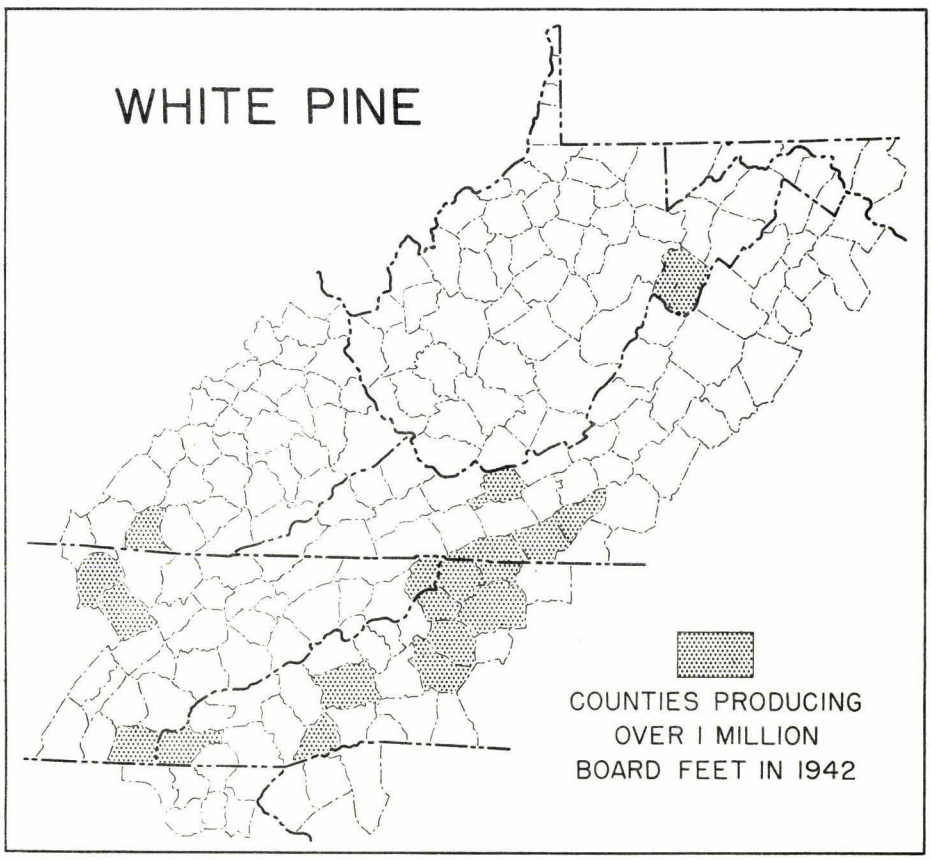
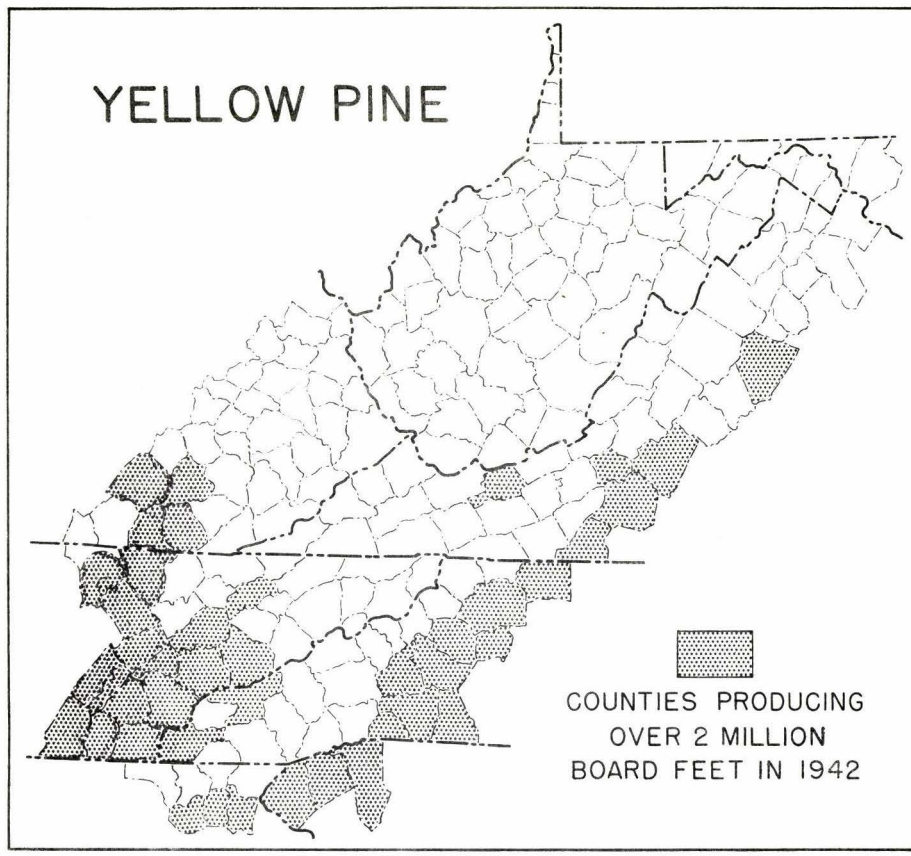


Figure 21. -- Counties leading in the production of walnut and white pine lumber, 1942.



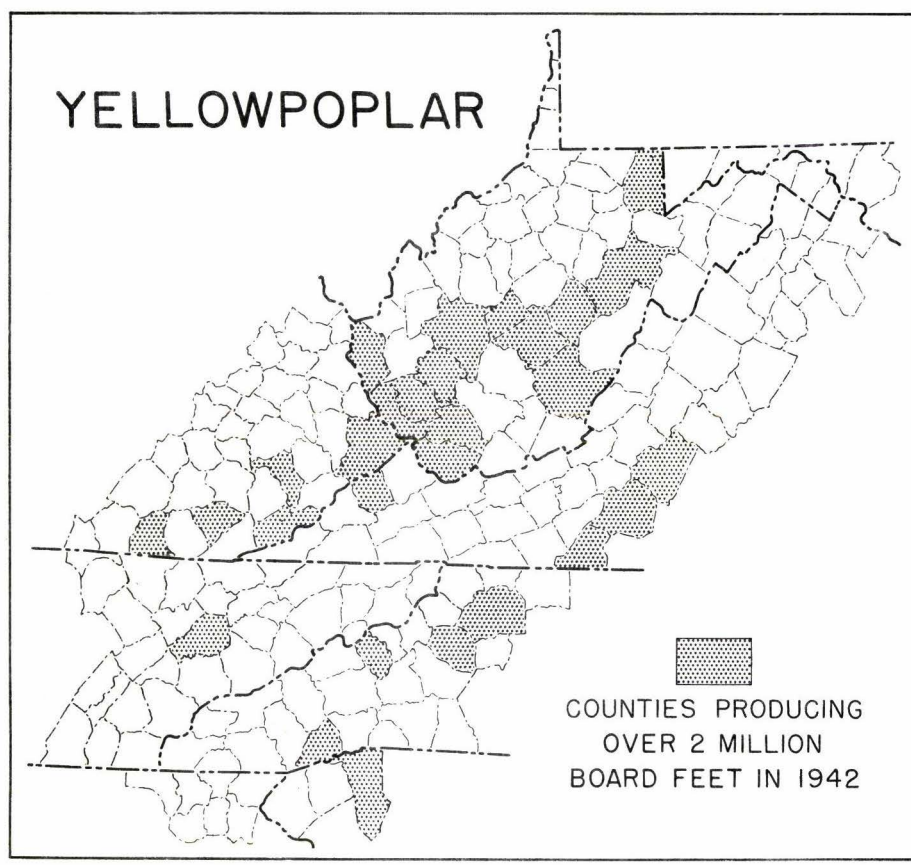


Figure 22. - Counties leading in the production of yellow pine and yellowpoplar lumber, 1942.